VOLUME 10 NUMBER 1

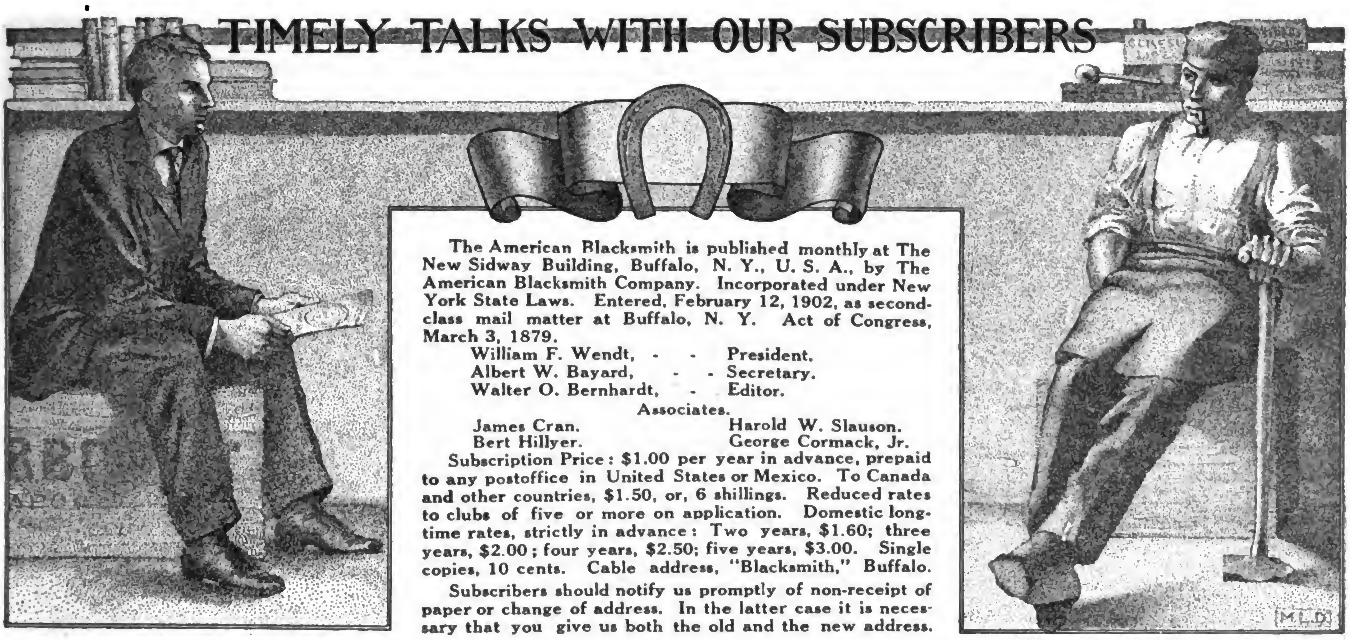
THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y. U.S.A.

OCTOBER, 1910

$1.00 A YEAR
10c A COPY



The American Blacksmith is published monthly at The New Sidway Building, Buffalo, N. Y., U. S. A., by The American Blacksmith Company. Incorporated under New York State Laws. Entered, February 12, 1902, as second-class mail matter at Buffalo, N. Y. Act of Congress, March 3, 1879.

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Subscription Price: $1.00 per year in advance, prepaid to any postoffice in United States or Mexico. To Canada and other countries, $1.50, or, 6 shillings. Reduced rates to clubs of five or more on application. Domestic long-time rates, strictly in advance: Two years, $1.60; three years, $2.00; four years, $2.50; five years, $3.00. Single copies, 10 cents. Cable address, "Blacksmith," Buffalo.

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A Money-Making Story.

A money-making story is always interesting, and especially so when the investment is small and the same thing possible of duplication by anyone. And this story is not only interesting—not only possible of duplication by anyone—but, what is most important, it is absolutely true. We got it direct from the man most concerned, and he ought to know. His letter is a long one—just received it yesterday—so we will pick out its most vital points for you.

The letter came from a man who placed a little for-sale advertisement in our classified columns. He paid four dollars for the little ad to appear twice. Up to the time of writing his letter the man received some eighty replies and forty orders from his little ad which appeared twice.

These forty orders amounted to exactly $412.75. One of them was for $35.00 worth of goods, another $22.00 worth, still another $15.00, and so on down, all of those forty orders, with perhaps one or two exceptions, amounting to more than the actual cost of the little advertisement which appeared twice.

And all this to say nothing of the repeat orders—the orders certain to come from some of those who asked for information—the orders certain to follow from other readers of that little ad which appeared twice.

If you have any doubts about this little story we'll gladly tell you the name and address of the man who paid for the ad, sold the goods and received the $412.75.

If you are interested in placing anything before smiths, horseshoers and vehicle-builders, ask us for suggestions. If you can make a tool, machine or stock item that blacksmiths of any kind can use, tell us about it—we have some good suggestions for you. There is no reason why you cannot do as well or better than this man did with his little ad which appeared twice.

The Railroad Smiths.

The International Railroad Master Blacksmiths' Association held its Eighteenth Annual Convention recently at Detroit, Michigan. A number of very valuable and interesting papers were read, and several of these are reprinted in this issue.

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Into Volume Ten.

With this month begins the tenth volume of THE AMERICAN BLACKSMITH. The program for this tenth volume has been planned along the same lines that have governed "Our Journal" since the beginning—has been planned with the one idea of serving "Our Folks" to the best of our ability—the policy of the "Blacksmiths at the First Table"—reader's interests first, last and always, with a fair and square deal for every one.

The coming issues of "Our Journal" will have much of interest and value for every up-to-date smith. There will, of course, be special issues, featuring some branch of the craft, the same as in the past. Contributors will be the best that it is possible to secure. And the articles will be of such quality and standing as to still further insure our being classed as "the foremost authority in the smithing field."

We have already introduced you to some of the writers who will contribute to our columns during this coming volume. Others will, of course, be added as the seasons for their writings open. Mr. J. N. Bagley, who makes his introduction to "Our Folks" in this issue, will make a specialty of motor and gas engine troubles—a subject that is of much interest to our readers just at present. Mr. Bagley will also assist in replying to questions on general craft topics.

In this connection it may interest you to know that the question department is being made more valuable each month, and an announcement will shortly be made that will show how helpful this department is to those who want its help.

Those of you who remember Mr. J. F. Sallows' article on casehardening in the December issue of 1908 will welcome the news that a new series from the same writer's pen is expected shortly. This series promises to create a furore in steelworking and automobile centers, and those of you who are interested in either subject will want to read these articles.

Space prevents our detailing all of the features for the coming volume, but you who have been one of us for any time know that "Our Journal" may be depended upon for at least twenty-six pages of good, sound, practical craft information every month, and twelve times a year.

THE MODERN PLOWMAN DRIVES AN IRON HORSE AND TURNS EIGHT FURROWS (SOMETIMES MORE) AT ONE TIME

Utilizing Scrap Material and Some Labor-Saving Tools

L. J. BRUNNER

THE scrap pile is one great source of revenue to the railroad company, if looked after as closely as it should be by the foreman. There are hundreds of jobs that come into the blacksmith shop that can be made from old material and answer the purpose fully as well as if made from new stock. In large plants, where the scrap of the whole system, or from several divisions, is deposited, a good, intelligent man—one who is familiar with car and locomotive work—could be saved and put into service again with little or no labor.

I have conferred with a number of men who claimed that it did not pay to use old material. I maintain that it does pay, and pay well, if good judgment is exercised in its use. If the cost of labor to make it available is greater than new material, or if old material is allowed to enter parts requiring new material, then it is poor economy, but if properly handled a great deal of money can be saved annually.

system of utilizing scrap iron and steel for all purposes where it could be done advantageously. When I began to instruct the men as to what I wanted done in the matter, some of the older hands were astonished to think I wanted old material used, but I soon educated them up to the point where they knew as well as I did what parts could be suitably made from old material, and the system has worked very well ever since.

I have made a close study of the scrap

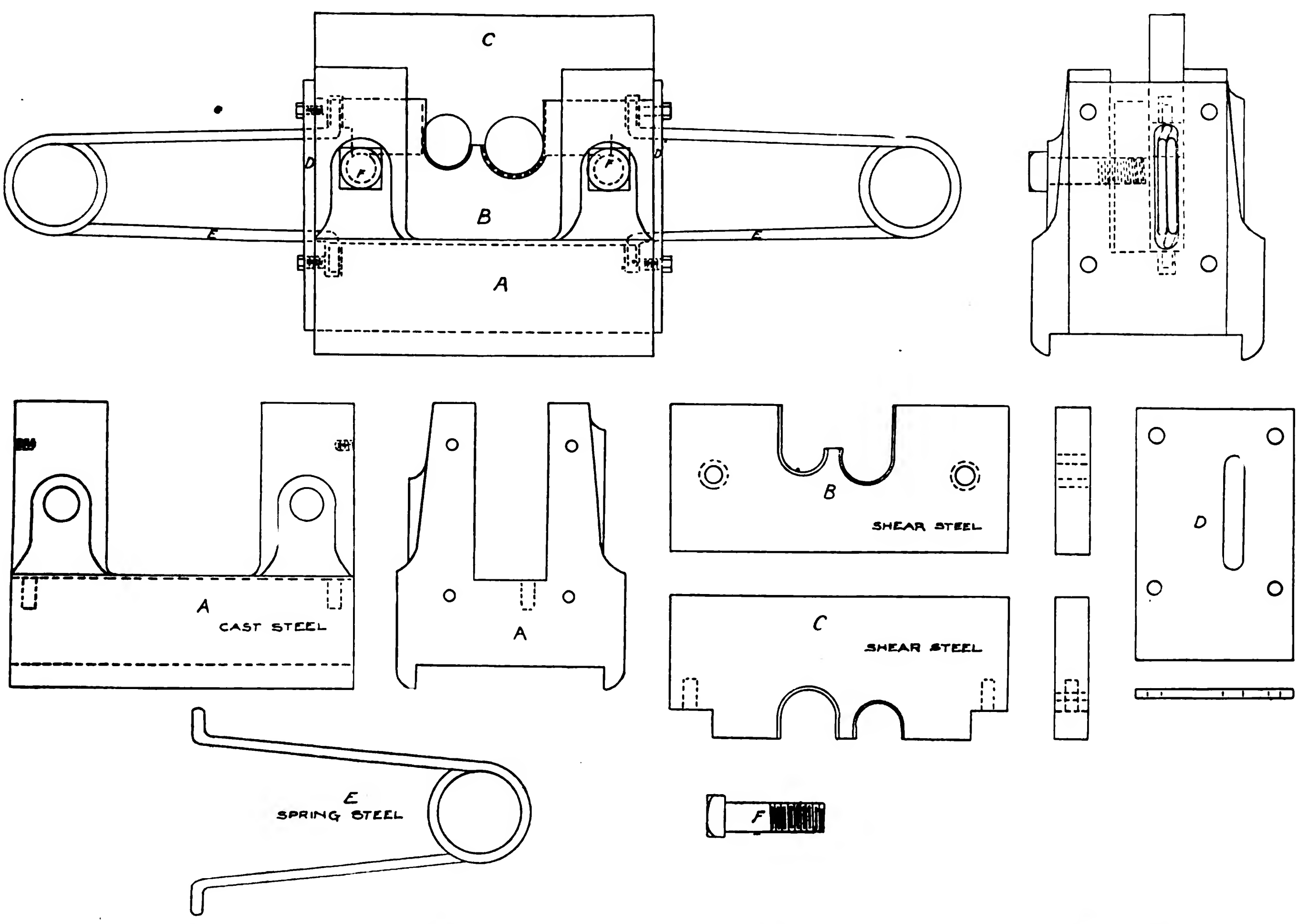
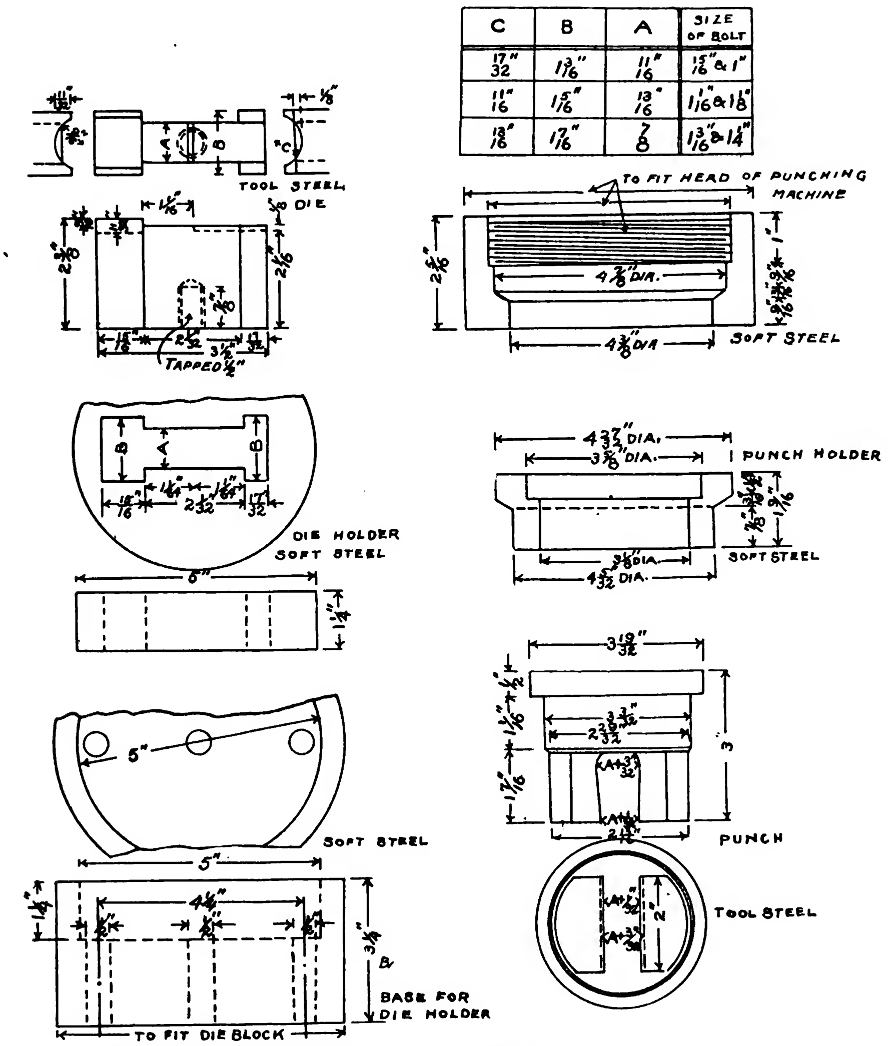


FIG. 1.—SHOWING A SHEAR, ASSEMBLED AND IN PARTS, FOR CUTTING IRON COLD UNDER THE STEAM HAMMER

should be stationed at the scrap bin to look over and sort all good material that finds its way into the scrap heap. It is surprising to see the thousands of good pieces that are found here that

To illustrate: Previous to the time when I took charge of my present position, there was very little, if any, old material used at this point. As soon thereafter as possible I inaugurated the

pile for years, and I claim that it is profitable if properly looked after. As soon as I got this system well established here, I kept a record for my own information for one year, which showed that



C	B	A	SIZE OF BOLT
17/32"	1 3/16"	11/16"	15/16" & 1"
11/16"	1 5/16"	13/16"	1 1/16" & 1 1/8"
13/16"	1 7/16"	7/8	1 3/16" & 1 1/4"

FIG. 2.—A PUNCH AND DIE FOR SHEARING SQUARES ON STAYBOLTS

I had used 445,000 lbs. of old iron and steel during that period, and had rescued thousands of good parts that required very little labor to make them serviceable. When the difference in the price of the old and new material is considered, it is no idle claim to state that this did pay. The extra cost of handling the scrap is very little, as the man in charge of the scrap bin picks out everything he sees that he thinks is useful and lays it one side, and whenever I have a little spare time I look it over and have the laborer that wheels out the scrap from the shop bring back a load with him each trip and store it in a large bin, conveniently located outside the shop, until we have use for it, from which place we can get it as quickly as from the storeroom.

The accompanying engravings show a few tools that give excellent satisfaction:

Fig. 1 is a shear for cutting iron cold under the steam hammer. For anyone who has a steam hammer, but no shear, such a tool is indispensable. The shop I had charge of when I designed this tool, had no shear, and all of our iron had to be cut off on the anvil, which was a slow and laborious task. With this tool I could cut off 2 inches round with one blow, and 6 by 1 inch with two or three blows, under an 800-lb. hammer. I had three sizes: one for 2 inches round, one for flat and one for ½ to 1¼ inch, as shown in the sketch. The body is a steel casting, made to fit width of the hammer on which it is to be used, with gibs on each side to prevent it from sliding. The blades are made of sheer steel.

In Fig. 2 is shown a punch and die for shearing squares on stay bolts. This is a valuable tool for anyone who has a punch and does much of this work. Before I had this tool, one blacksmith

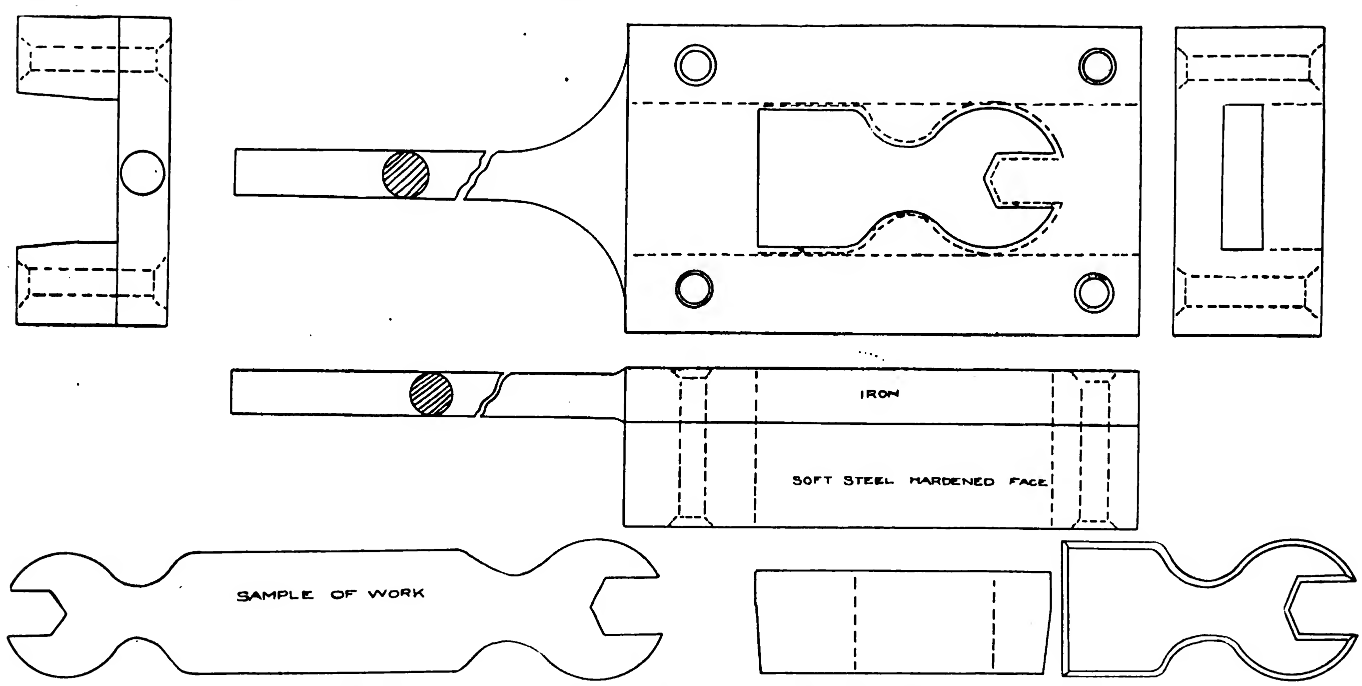


FIG. 3.—SHOWING A HANDY TOOL FOR PUNCHING OUT WRENCHES UNDER A STEAM HAMMER

and a helper would square up hot, under a belt hammer, from 700 to 800 staybolts per day, but with this tool one helper can square up 3,000 per day, thus saving the wages of one blacksmith, the cost of fuel, and makes the hammer available for other purposes. It is further claimed that staybolts squared up cold give better results than those that have been heated. Liners can be made of various thicknesses to conform to the shape of the male die, for taking up wear until the die is practically worn out.

At Fig. 3 is shown a handy tool for punching out wrenches under a steam hammer. By having dies made to fit all sizes of nuts, any combination of double-ended wrench can be made very quickly. Stamp out the large end first, using stock the same width as the opening in the die, then reverse the end and draw down to the width which the other end is to be, calculating the amount of stock necessary in the center for drawing to the required length. This style of tool can be used to advantage for a number of jobs, such as spring-hanger gibs, rod-strap gibs, tamping-bar ends, etc.

A tool for bending rod straps is shown in Fig. 4. It possesses the advantage of being adjustable to bend any width by the insertion of liners in the ends. The handle tool shown is used in connection with the mandrel that the strap is closed down upon. The oil cup is placed in the opening, the remainder resting upon the face of the tool, thus insuring a straight surface with very little labor.

Fig. 5 shows a portable oil burner. Such a burner with a tank mounted on a two-wheel truck is a great convenience. Every shop should have one or more of them that can be transported to the engine for straightening frames, guide yokes, tail bars, etc., thereby saving a vast amount of time in the erecting and blacksmith shops.

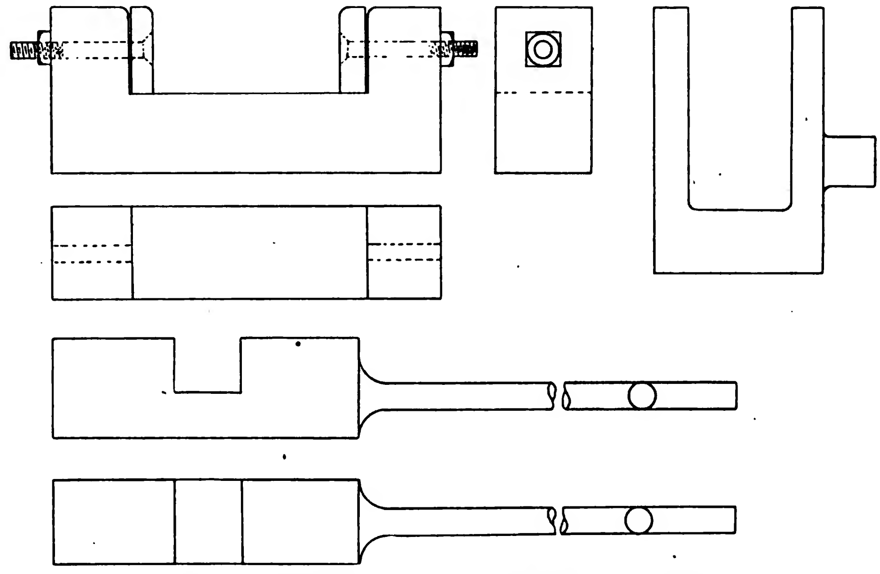


FIG. 4.—SHOWING A TOOL FOR BENDING ROD STRAPS

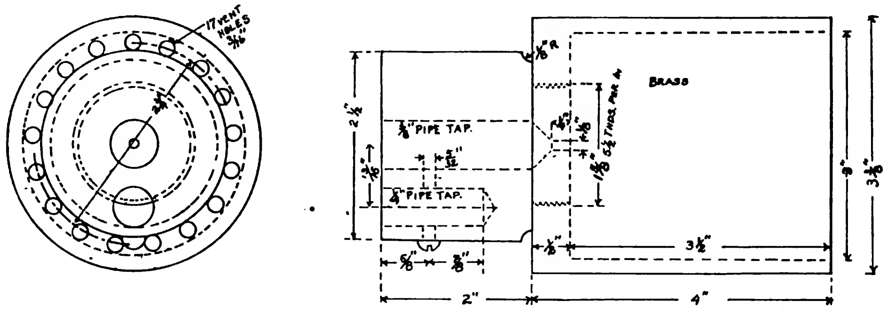


FIG. 5.—HOW TO MAKE A PORTABLE OIL BURNER

In Fig. 6 is shown a tool for rounding the ends and punching slots in spring hangers.

Fig. 7 shows tools and method for making rocker arms. Best results are obtained from rockers made in this way, for the reason that the grain of the iron runs in the right direction for resisting the strain on the arm. They have but one weld, which is in the center, at which point it is a rare occurrence for them to break. It requires but three heats to make each end. The body of the arm is drawn down to fit the hole in the block

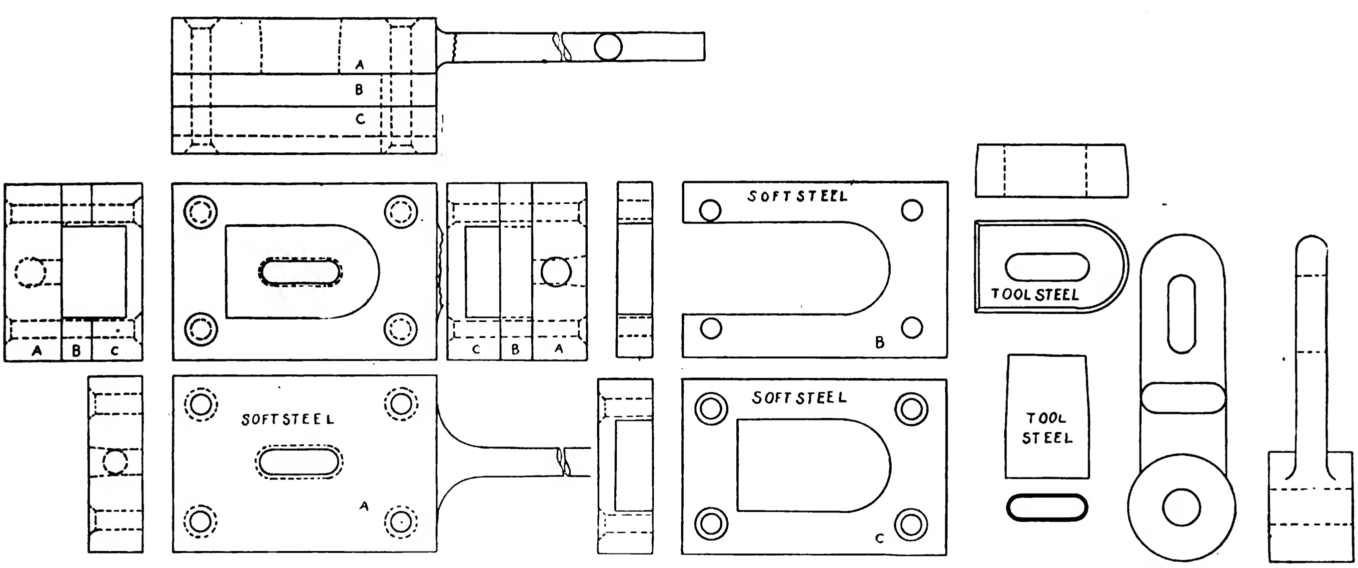
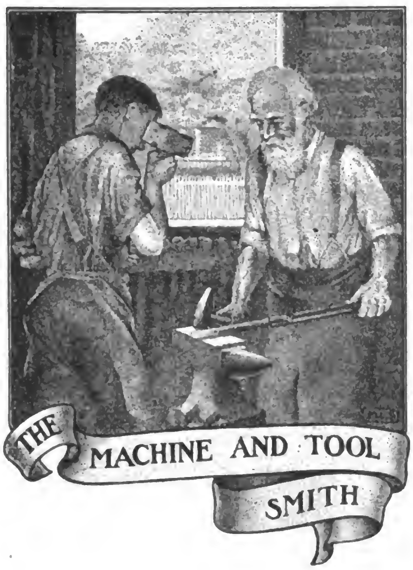


FIG. 6.—SHOWING A TOOL FOR ROUNDING THE ENDS AND PUNCHING SLOTS IN SPRING HANGERS

in the first heat. In the second heat it is checked down for the arm and bent in a V-block, as shown, and is completed in the third heat. It is then welded in the center with a male and female weld, the result being a very reliable arm that has been made with the least possible number of heats.

The engraving at Fig. 8 shows dies and plunger for making front and main rod keys on a 3-inch Ajax forging machine. Draw down 2 x 2½ inch double refined iron on one end to the size of the stem, then place in the die. One revolution of the machine completes the job.



Tools and Formers.

ARTHUR STOCKALL.

There has been so much said on this subject that it seems hard to say anything more, but every year calls for new efforts in this direction, and I suppose it will be so always, as there is always a demand for more economy in tools and speed in manufacturing, and this demands that tools and formers be constantly changed in shape so as to reduce breakage in material, cost of tools and time in making a given piece of work.

Therefore, in the designing of tools there are three things that should be borne in mind: The saving in material, the life of the tools and the ease with which to handle. And in the carrying out of these things lies the true success in handling our work; for I think that it is better to have two simple tools to make one piece of work than one complicated and expensive tool, with the danger of breaking the material in the end.

Now we will take the bulldozer:

The formers for this machine, I think, can be made cheaper and more conveniently with cast iron reinforced with hardened steel at the places where friction will take place, so that instead of wearing out the casting the steel will take the strain, and when this is worn out it can be removed and a new piece put in.

In other formers and, in fact, wherever possible, the roller-tool should be used as the best means to save material and power.

Then there is a tool that can be used to make a lot of work, such as freight car steps, carrier irons for passenger cars, glands and all such work where a double bend is required, or a good, square corner is needed. I mean a tool with a hinge made so that it will move back far enough to allow the iron to be put in, and far enough apart to let the ram come down to square up the crown or middle of the work, thus making a good, clean, square job that no one need be ashamed of.

Now, as I have said before, these tools may be made out of good, clean castings, reinforced with steel at wearing points and machined where necessary, and by a little foresight they may be made so that one former, with a liner put in, can be used for different articles of about the same shape, but different size; this will save cost of tools and cheapen production. And here let me say that, in all cases where cutting or punching hot material is required, high-speed, self-hardening steel is the stuff. It costs more to put it in, but how slick it does its work, and what a relief to the burdened foreman and a joy to the worker. No more running water, no more burning and peeling of dies or punch or cutter, and consequent bending and breaking of tools, with the machine out of order half the time, and the toolmaker swearing and the workman grumbling.

I well remember my own experience of four years ago in this line. I was punching a lot of steel follower plates, and they were pretty hard and, of course, the usual trouble was intensified by this. If we used water to cool the

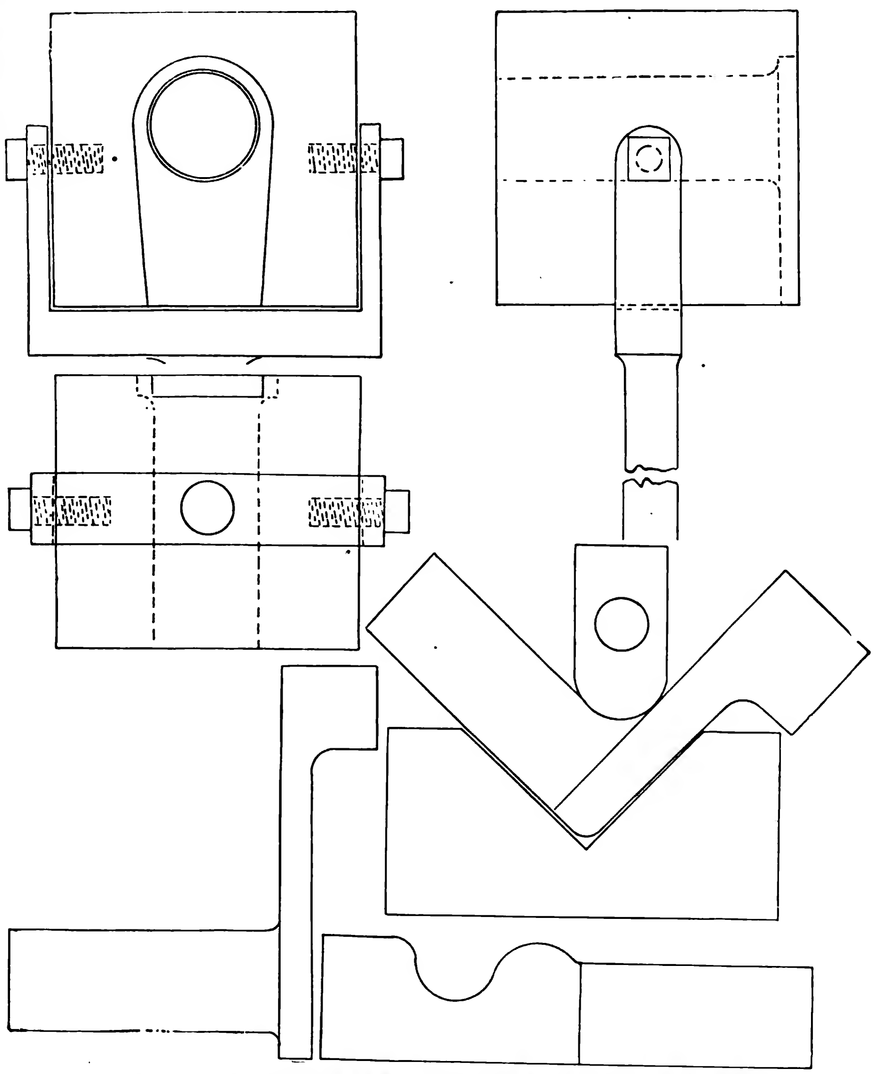


FIG. 7.—THE TOOLS AND METHOD FOR MAKING ROCKER ARMS

tools they split and broke, and the man wading in mud and growling and doing very little—and to tell you the truth I was about to give up and fall back on the drills, but high-speed stuff came into my head, and off I started for my toolmaker and to him I stated my case. "I won't do it," said he, "it is only a waste of time and material." "Let's try it, anyway," said I. "I won't," said he, nor would he until I went to the master mechanic and got his doubtful consent, and at last the tools were made and put in and the difficulty was gone. My workman worked, and at night he got full celebrating the high-speed tools. It's the stuff for this kind of work and pays 100 per cent every time.

Tools for Bolt Heading.

I used to think at one time that mild steel was good enough for this work, and I tried it thoroughly. It was not satisfactory. It would burr up in spite of all I could do. "Caseharden it," said my boltmaker. This I did, with the result that almost always the block would warp or bulge in the middle, and in grinding this out the casehardening would be gone and my labor went for nothing. Then I heard a fellow say cast-iron chills were fine and cheap. "Good for you," thought I, and I tried this. I found that the blocks would chip and split in two, and chilled tools in my opinion are a waste of time. Good clean, cast-iron tools in my mind are superior to any of the other above-mentioned for durability and economy. They can be put in and used with a little grinding, and when used up can be sold for scrap for more than scrap soft steel.

But I think from my experience that self-hardening or a good water-tempering steel is best for this work; it costs more, but lasts longer and does better work while it does last, and for machine forgings of all sorts, a good, hard, tough cast steel is the best.

Steam-Hammer Tools.

For this tool *nothing* is too good, and you can make an endless variety of things under it, and a good material for this tool is the question. A dense-grained, cast-steel top and bottom die of about .30 point carbon is used. For swedges, a good, hard, soft-steel is the best. For forming blocks use cast iron, with a wrought iron band around it to keep it from splitting, and you have a tool that will make almost anything. The steam-hammer has an exceptionally wide range of usefulness, and with a number of well-planned, well-made tools a great number of things can be made on it. In fact its usefulness is limited only by the smith's ability to plan and make suitable tools for use under it.

The Correct V-Weld.

A. W. M'CASLIN.

When visiting other shops and others visiting our shop we may see many things that are not in keeping with the best practice, and we know they are not, but we do not know why they are thoughtlessly continued.

Some time ago the writer visited a shop that was considered above the average in its management; the blacksmith operating the big fire was making what should have been a side V-weld in a main frame, and, instead of making the V a 45-degree angle, or much less, the lay-in piece was perfect in shape and size for a butcher's cleaver. This is no exaggeration, neither was it a weld.

You will pardon me when I say that many of us do not give this weld the consideration we should. This weld, as usually made to an angle of 45 degrees, found favor with blacksmiths, owing to the fact that the lay-in piece required no preparation; any old piece of square iron could be thrown in.

This weld will shear in the making, or in its reduction, and sometimes separates in straightening under the steam hammer. It is more difficult to heat up at the point of the V than when the angle is less acute (wider across the top of the V).

We have another shop in mind that has what they term standard tools for preparing this weld. The top tool for forming the V-cavity is made to an angle of $33\frac{3}{4}$ degrees, the tool for forming the lay-in piece to an angle of $35\frac{1}{2}$ degrees. This weld will have a lap of $7\frac{1}{2}$ inches when the point of the V reaches the center of a 5-inch square bar, and, of course, will carry out proportionately in a less or greater depth in different sizes of iron to be welded this way.

The lap in this weld is $\frac{1}{2}$ or $2\frac{1}{2}$ inches greater than the cross section of the bar to be welded, and $2\frac{1}{2}$ inches or 50 per cent longer than the 45-degree angle weld in the same size bar. The $\frac{1}{2}$ and $\frac{3}{4}$ degrees mentioned above have no significance other than to be exact.

These tools are easily forged and will answer for several sizes.

You will note the difference in the degrees of angles in the V-cavity and

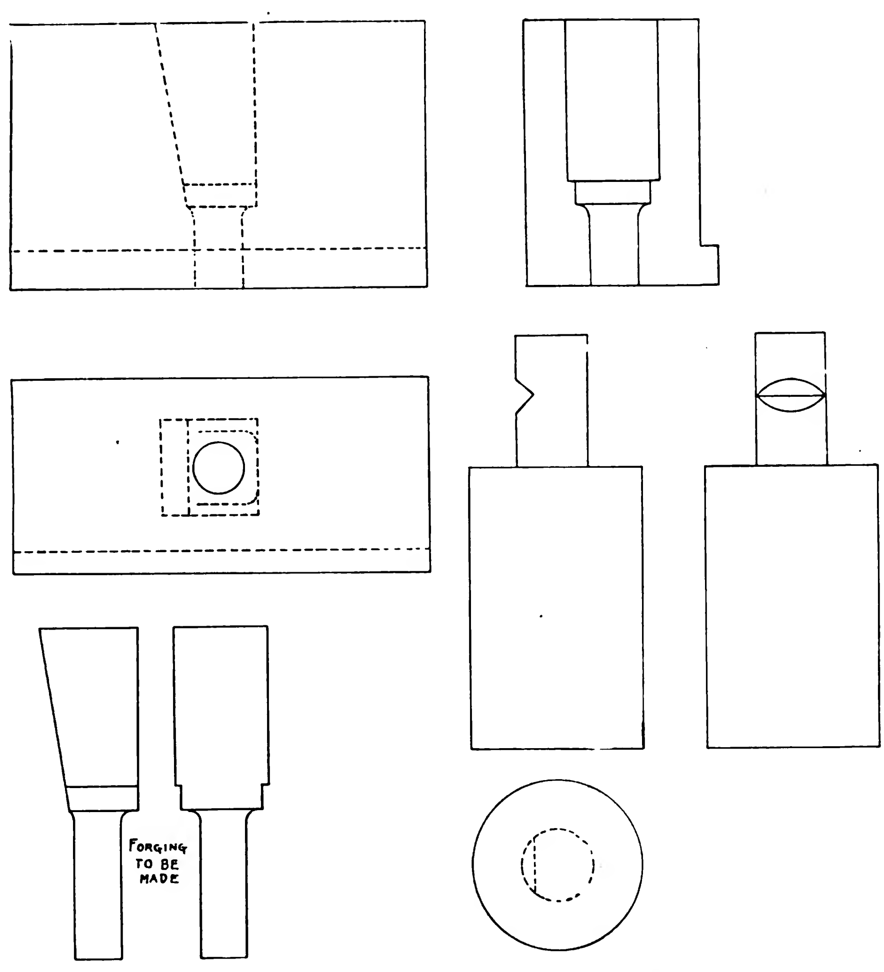


FIG. 8.—DIES AND PLUNGER FOR FORGING FRONT END MAIN ROD KEYS

the lay-in piece; this permits the lay-in piece to drop to the bottom of the V-cavity without shearing.

In this shop there are many lay-in pieces of various sizes carried in stock; this leaves them always ready for this weld, no matter what size it may be.

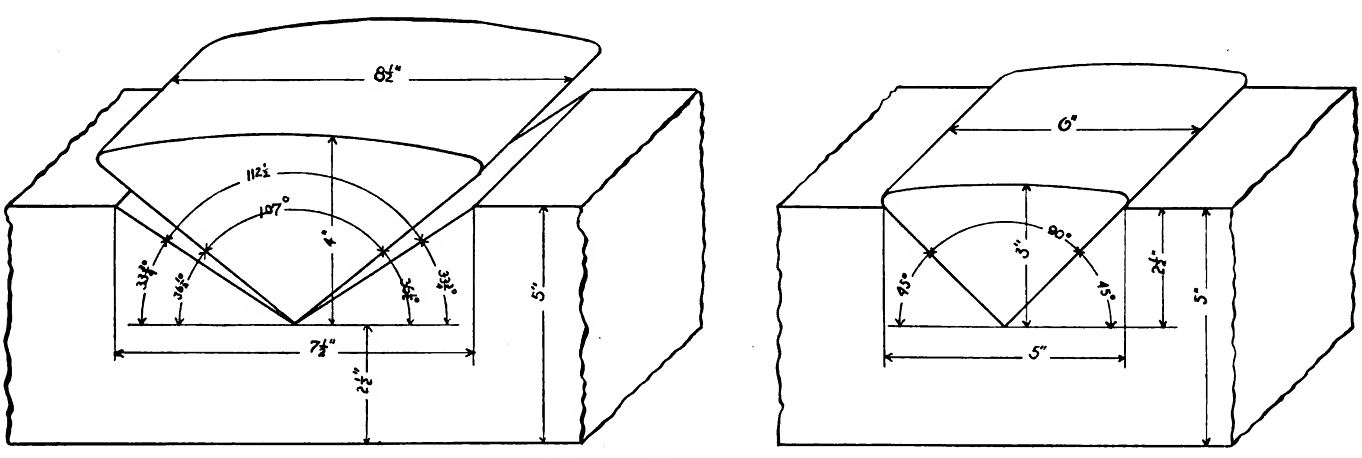
Some may say the 45-degree weld is a common-sense weld and is good enough. There is nothing good enough that can be made better, and there are two kinds of common sense—a very poor kind and a very good kind. We should always use the good or best kind when we wish the best results.

Another point I wish to mention is that of fillets in all our forgings, and a radius as large as permissible in the inside of all right-angle bends.

An inferior weld is serious enough, but there is nothing in our business that adds as much to the number of failures or breakages as does the lack of fillets. There is scarcely any part of a locomotive that will not accommodate a good fillet, yet this fact is often disregarded, and many avoidable breakages occur.

I would be glad to know that I were one of a very great many who will not permit such tools as sharp-cornered flatters, set hammers, swedges, etc., in the shop we have charge of.

Fillets leave the grain of the iron turned in the proper direction with little strain and form a brace to the corner in proportion to their radius. Should they interfere with the machinists applying the parts, let them be responsible for the removal of them.



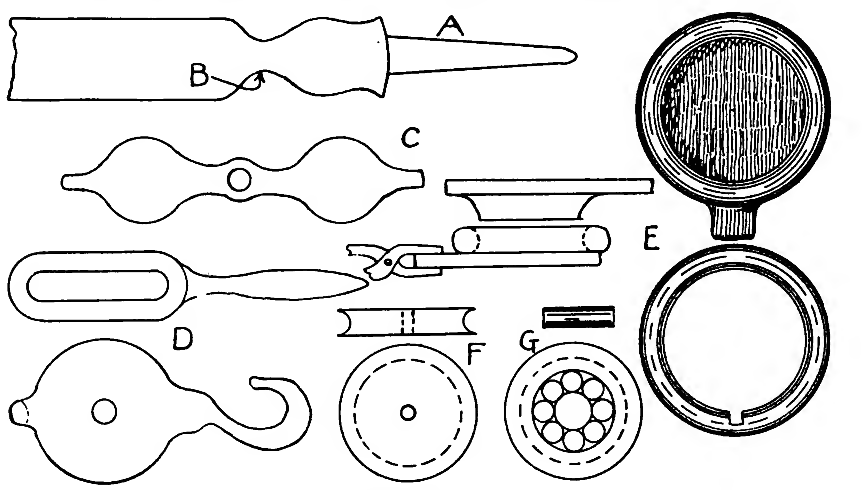
THE CORRECT AND INCORRECT METHOD OF MAKING A SIDE V-WELD

How to Make a Sheave Block.

BERT HILLYER.

Take a piece of square soft steel and forge out in shape similar to A, fullering in as shown and drawing the stem out round. Then cut off the round end. Now punch small hole at B in upper part of block. This can be done by placing neck on the horn of the anvil. Now put it in a bottom swedge and split it down the center, cutting from both sides. Then spread out the sides. Now, take a heading tool that is countersunk on one side and put stem that was cut off down through it and flatten one end down. The sides are then pounded out thin and flat. On the ends of the sides small, round pieces are drawn out, as at C. The piece is then bent in a U shape and the two small ends welded together. The round part is then drawn out tapering and bent into a hook, as shown at D.

We next forge the sheave wheel that goes inside of the block. This has a groove around its edge for the rope or cable to work in. If a machine shop is handy cut out a disc and have the groove turned out in a lathe; if not, make it yourself. Some might fuller this in, but it hardly makes a good, true job. A better way is to take a piece of round iron a little larger than the diameter of the rope that is to be used and make a ring of it, welding the two ends together. Then round it up nicely and true it. This is to be used as a tool to make the groove. Now, take two pieces of iron so that when they are laid together they will be about half again as thick as the finished wheel and a little larger than the outside of the ring. Heat both pieces at once to a good heat. Then take to a steam hammer if you have one, and place ring in between them, pounding them down until the sides just meet. This will leave you one half of the impression in each plate—see E in engraving. Next, take a hot cutter that has been bent to suit the radius of the wheel and cut half of the groove off all the way around, except a small piece left to handle it with in the tongs. This can be cut off after the two pieces are welded together. Take a nice clean welding, heat on each half, put ring on bottom half, and then put top half on so that the two hubs meet inside the ring. This should all be done quickly; then weld up. The ring acts as a guide in welding them and also shapes the groove at the same time. Before taking the welding heat, the ring should be cut half in two from the inside. This is done with a hack saw in order to get it out of groove



HOW TO FORGE A SHEAVE BLOCK.

after welding, when it is cut from the top to meet the other cut. It is then heated and sprung off. A hole is then drilled in the center for a pin or rivet to go through. To lighten up wheel, three large holes should be drilled, as at F.

If you should want a roller bearing wheel, drill a larger hole in center of wheel and cut off a number of small round pieces, as at G. These should be cut of a length just the thickness of the wheel and are easily cut with a hack saw. The wheel should be laid down flat on a piece of iron, the pieces assembled around hole and a cork or a round piece of wood driven in to hold them tight, so that they will stay in place when put in block. A thin washer is then placed each side of wheel and the pin is then put in sheave block and the cork is driven out the other end, the pin following it through. Now, key or rivet the other end. There is no doubt you could buy one cheaper, but not better nor as strong, and often occasion arises when an especially well-made tool is needed, or one of special design or weight. The smith can usually meet such demands if he is naturally gifted with a mechanical mind.

Oar-Locks of Special Design, and Grappling Irons.

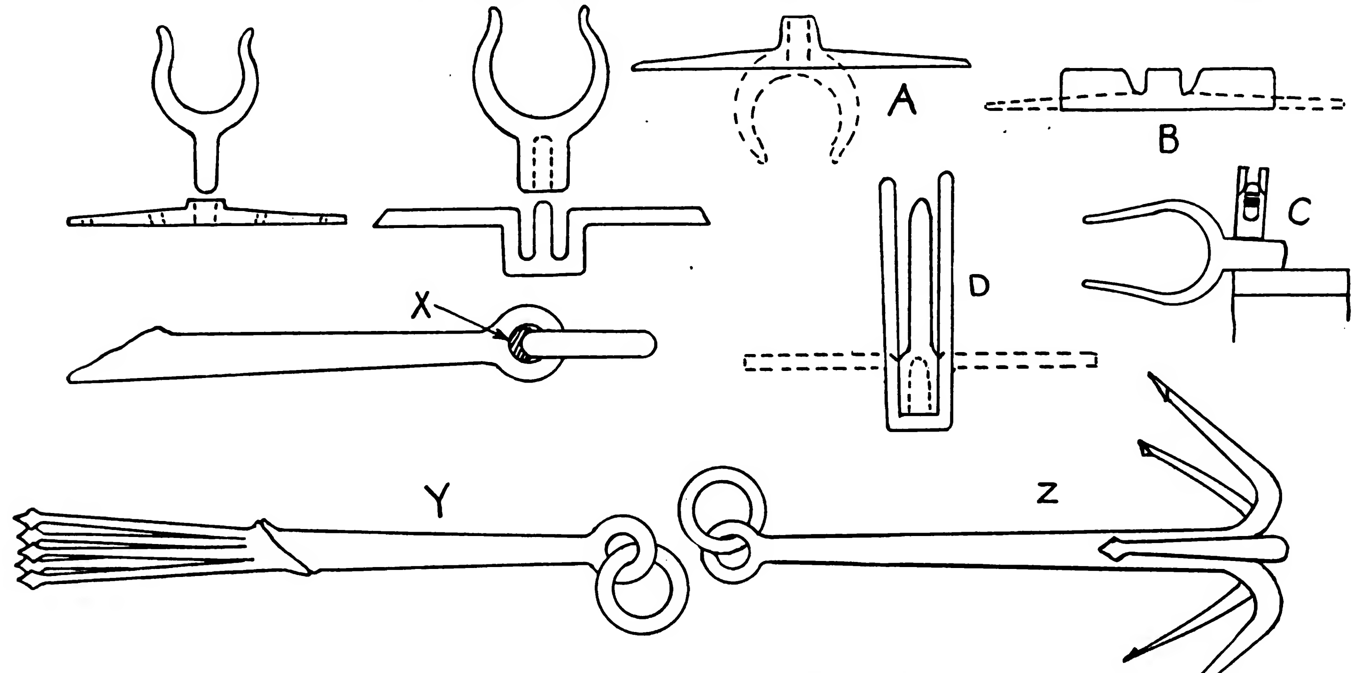
BERT HILLYER.

Sometimes a smith is called upon to make a small forging that could be bought readymade at a hardware store, at a low price. But sometimes the customer wants something that he knows is made of wrought iron or steel instead of cast iron that is liable to break at a critical moment, or he may want something different in design. A friend asked me if I could make a pair of oar-locks different from the ones sold in the stores, so that it would be impossible for any one to stick in the store kind and row off with his boat. The way I made them was just opposite in design to the usual style, as will be seen in the engraving. This made an excellent oar-lock without any lost motion, as it has bearing both on the inside and outside of the swivel.

A piece of oak wood with a hole cut out to fit the offset in the plate was fastened to the sides of the boat and the plate fastened to this. To make the swivel part, take a piece of 1-inch round, soft steel, flatten $2\frac{1}{2}$ inches of the end to $\frac{5}{8}$ inch thick, let it be as wide as it will come, and split this with a thin hot cutter. Then throw the split end out in the shape of a T. Next take a $\frac{5}{8}$-inch top swedge and swedge the outside of the prongs round and leave inside flat; then cut the 1-inch round part 2 inches long and drill a $\frac{5}{8}$-inch hole in the stem and bend the prongs as dotted lines show at A.

To make the stud plate take a piece of 1 by $1\frac{1}{2}$-inch stock and fuller in as shown at B. After the ends are drawn down to $\frac{1}{2}$ by 1 inch, take and bend them back so as to be able to get at the stem to draw it out—see engraving at C. Then swedge it so it will be a snug fit in the socket and straighten out the bent part. Put the stem in the socket of swivel and bend the two ends up, as at D. Then take a top and bottom swedge that will fit the outside of plate, as per arrows, and close in with light blows, so as not to injure the hole in the swivel. Now place the pieces in the vise and bend out as shown by dotted lines.

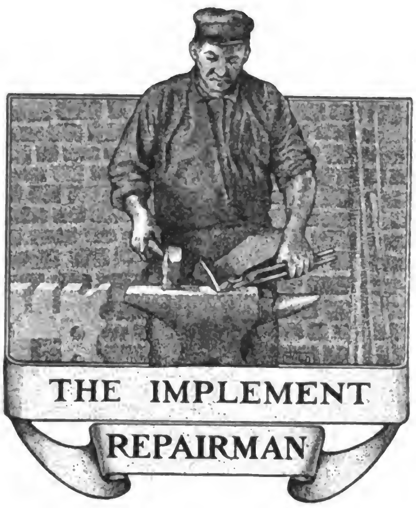
To make a grappling iron, such as is used to anchor rowboats and for grappling, take two pieces of $\frac{3}{4}$-inch round iron, 22 inches long, draw the ends of both to a short point. Then take a fuller and spread iron sideways on the points, making the flukes as wide as possible. Now cut each piece partly in two in the middle and bend the ends together. Then cut another piece, 11 inches long, point and flatten one end, and tie all the pieces in a bundle with a piece of wire to hold them together while welding the ends. After welding they can be scarfed with the same heat. Then take a piece of $1\frac{1}{4}$-inch round iron, 18 inches long, and forge an eye on one end. Then make a ring of $\frac{1}{2}$-inch round stock, $2\frac{1}{2}$ inches inside diameter, and weld it in the eye. A handy way to do this is to slip the ring through the eye, close the scarfs and then drive a wedge (X) in the space between the eye and the ring. This holds ring firm and makes it easy to handle in welding.



OAR-LOCKS OF SPECIAL DESIGN EASILY MADE—AND A GRAPPLING IRON

When this is finished weld the stock and prongs together (Y in engraving). Next take a good even heat above the place where it is welded, grip stock in the vise with the flukes up, and with a pair of tongs bend the prongs down to an angle of about 80 degrees. The

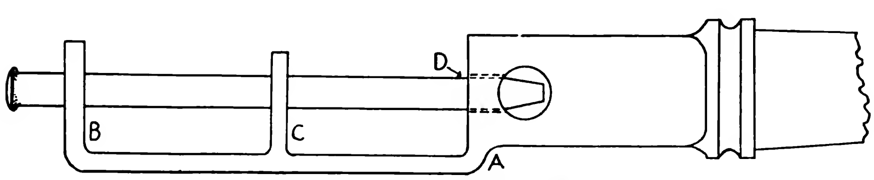
finished iron is shown at Z. In bending the prongs of the grappling iron, care must be taken to bend them evenly. The irons will present a more workmanlike appearance if all the prongs project at the same angle.



A Tool for Removing Rivets from Buggy Bows.

I. E. DAWSON.

This tool is made from an old buggy stub, a piece of flat stock and an old rake tooth, which serves as the punch. To make it, take the old stub and cut it off square, about 2 inches from the collar on the inside. Now take a piece of flat stock, ½ by 1 inch, and weld it on to the square end of the stub at A. This piece should be about 8 inches long and be bent over at the end, as at B. Then, about the middle of the upright piece, punch a hole and rivet in a piece as at C. Before riveting this piece a hole must, of course, be punched in it for the rake tooth punch to work in. Now drill a hole in the end of the stub for the punch to enter and, after shaping your rake tooth, your punch is complete. This device will save time and trouble in getting out bow rivets, and after using it the vehicle-man will not want to do without it.



A TOOL FOR REMOVING RIVETS FROM BUGGY BOWS

How to Make a Multiple Socket Wrench.

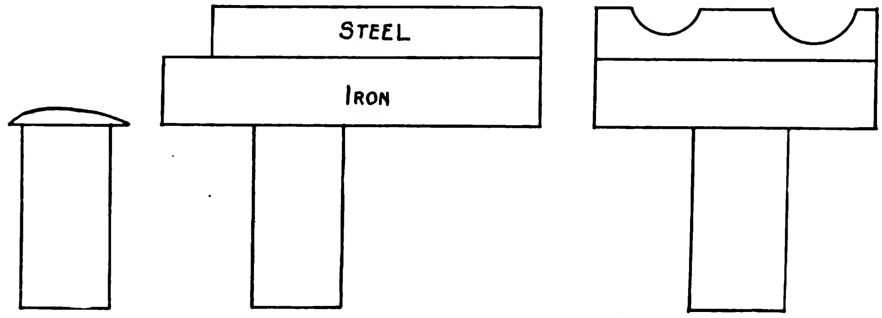
W. H. WISENOR.

The ordinary socket wrench is a great convenience to the repairman, but one which can be used on nuts of four different sizes will be found indispensable. To make this wrench, secure two pieces of ¾-inch round iron, 14 inches long. Bend each piece in the center at right angles and weld them at the corners, so the pieces will form a cross. Now take four pieces of gas pipe, 3½ inches long, and weld a band on one end of each pipe, and then square the banded end to fit the nut you want to use it on. The sockets can be made any size, but I usually make them ⅜, 7/16, ½ and ⅝. After fitting sockets to proper size finish them up and weld them to the pieces forming the cross. The wrench is then finished and ready for use. The vehicle repairman will find this an exceptionally handy device for taking down or setting up a job.

How to Make Swages.

H. N. POPE.

I make my swages double, i. e., two sizes in one block. To begin, I fit a piece of good iron in the hardy hole of the anvil, leaving lips all around for welding. Then take a piece of good iron, 3 by 5 inches, punch a hole in it and fit the square shank into this. Now cut a piece of 3 by ⅝-inch tool-steel a half inch or so longer than the finished swage is to be. This is to insure a good weld. Now put a little welding compound on the iron, place the steel in the proper place, take a good, slow heat and place the tool in the anvil and weld up, using the flatter. Then take a light welding heat and square it up. Now place in anvil and with the fuller mark lightly where the creases are to be. Then, with a piece of tool-steel and a top swage round up the creases. The ends are then cut off where they have bulged out. When cold, finish up with a file and harden a very little and you have a tool that will last a lifetime. It is not well to use soft steel, as it will not stand up well, unless faced. If the iron is allowed to run out a little longer than the steel, it makes a place for the chisel to strike if one wishes to cut off a piece after swaging.

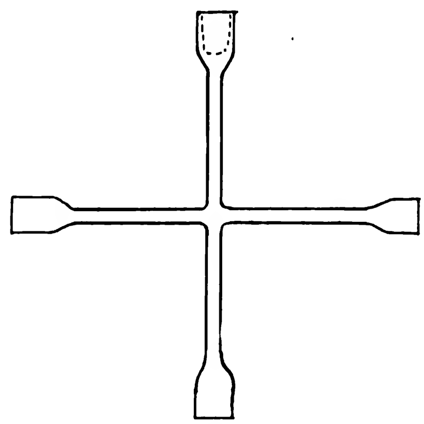


A SWAGE WITH A STEEL FACE EASILY MADE

How to Make a Socket Wrench.

L. VAN DORIN.

In response to Mr. C. Craig of Quebec, who wants to know how to forge a socket wrench to use in a brace, I will give him the quickest and best way I know:

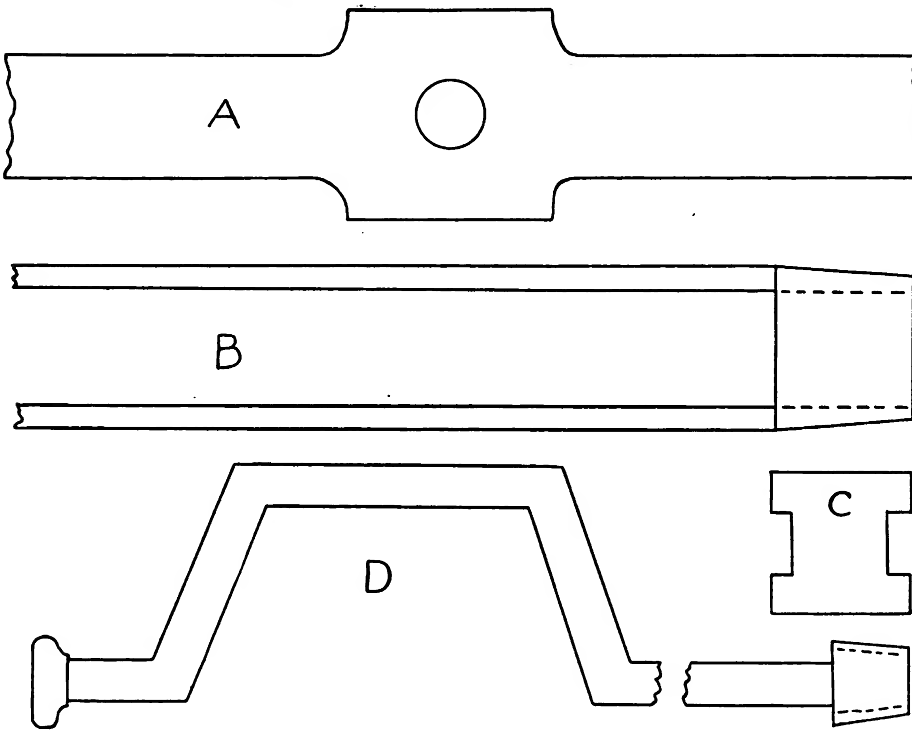


A HANDY SOCKET WRENCH

The size of material depends somewhat on the size of wrench desired; for instance, say for ¼ or 5/16-inch, I would use about ¼ by 1 inch and for ⅜ or ½, take 5/16 by 1¼-inch stock, preferably soft steel.

Commence by drawing shanks each side of center and after cutting material about six inches long, punch round hole, as at A. Then bend shanks at dotted lines at right angles, as at B. Next, insert a round mandril and draw until hole will take a square punch or mandril the size of the nut upon which the wrench is to be used. Then, if the ends of socket need truing up, drop the shanks between vise jaws and true them with hammer.

The next step is to make a plate, as at C, from ⅛-inch band iron; place it on top of socket, taking a tight borax heat to stick it. Then drill a hole in plate C



THIS SOCKET WRENCH IS FOR USE WITH A BRACE

to receive a bolt. Now close in ends of shanks, weld together and shape up for fitting brace. Then fasten to brace by thrusting bolt through the plate C, and run a nut on the bolt. Some may prefer a much better way, namely, welding socket onto a swing brace, as at D.

The last few years I was running shop I kept a full set of these wrenches, running from $\frac{1}{4}$ to $\frac{5}{8}$ inch, inclusive, hanging up where I could get any size any time. It is wonderful the comfort they give. If you want to skin your fingers using a monkey wrench—and cuss—you can do it.

How to Harden and Temper Miners' Hand and Machine Drills

J. N. BAGLEY.

The man who happens to live in a mining district and can harden and temper the miners' tools can demand almost any price for his services. Miners' drills are divided into two classes: the hand drill and the cross or machine drill. The greatest trouble in hardening and tempering the drills is to get them so they will not crack after they have been used a short time.

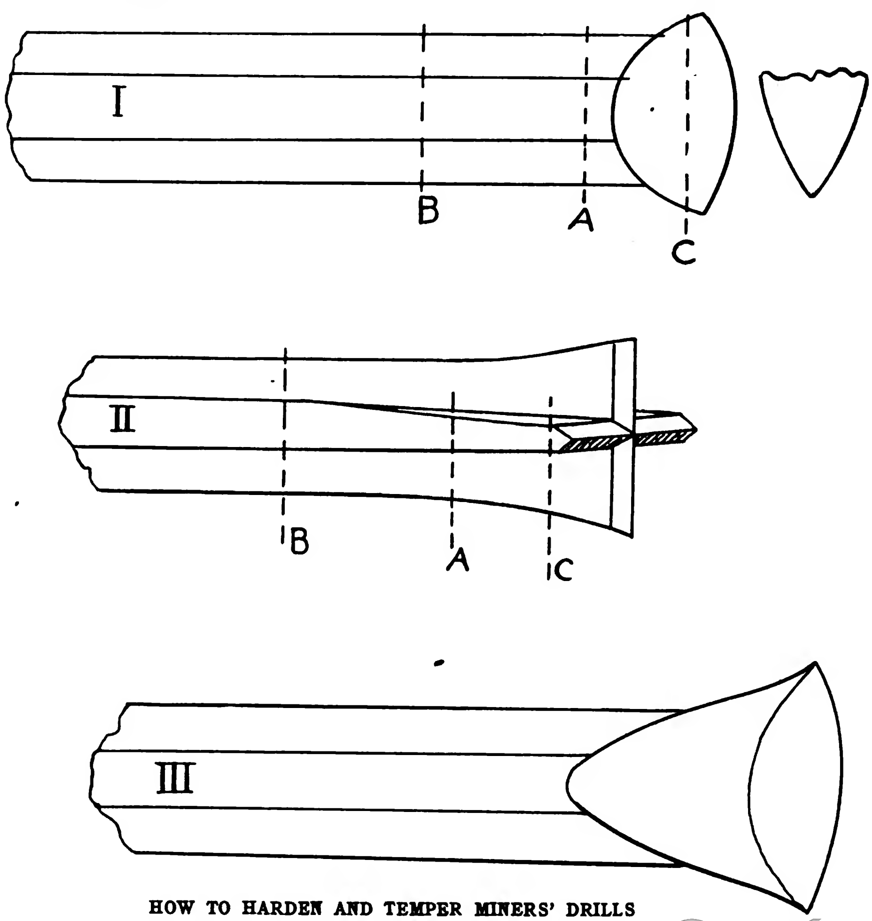
I will give a method that will prove an excellent one if carried out as it should be. The first thing to do after the drill has been dressed is to prepare a good, clean fire of well-burned coal, free from clinkers and sulphur (sulphur is very injurious to steel), and well heaped. Next in order is the bath for the cooling, which should be made up of rainwater, and salt added to make a brine.

After the tool has been dressed, place it in the fire and heat to a cherry red as far as indicated by dotted line A, in Fig. 1, after which remove from the fire and plunge into the cooling bath, cutting edge down, and leave until stone cold. It should then be polished, but before drawing the temper it will be necessary to know the kind of rock that is to be drilled, for hard rock will require a different temper than will the soft rock. Place the tool in the fire, leaving the cutting edge sticking out two to three inches, and blow the fire very gently. If the rock to be drilled is soft, draw the color to a light blue, but if the rock is hard like granite, draw the color to a dark straw as far as indicated by dotted line C, but draw no temper at the extreme cutting edge.

Fig. 2 shows a diagram of a machine cross drill which may be tempered in the same way as the hand drill. If the drills are very small a very good plan is to draw the temper with the blow torch, applying the flame a little way from the cutting edge, and turning the tool to insure an even heat. When hardening the machine drill, it should not be hardened as far back from the cutting edge as the hand drill.

The main cause for drill breaking is an uneven heat in the hardening process. Many times a drill will break when properly hardened and tempered, but if examined closely it will be found to be short of clearance on the corners.

The rock reamer may be hardened



HOW TO HARDEN AND TEMPER MINERS' DRILLS

and tempered after the same method as the drills, except for hard rock, when it should be hardened about $\frac{3}{4}$ of an inch from the end and no temper drawn. If the heat is made uniform it will not break unless pinched or twisted.

In every case the first thing to do when a drill is brought to the shop to be redressed is to find out the kind of rock to be drilled and govern yourself accordingly, and by using the methods already described there will be no trouble in getting a temper that will give satisfaction.

MR. C. F. BROSTROM OF MINNESOTA ALSO REPAIRS TRACTION ENGINES

Soliciting Business and Collecting Accounts by Mail.

A Series of Straight-to-the-Point Articles Illustrated with Letters That Have "Turned the Trick."

BY THORNTON.

We have already spoken about the opening—the part of a letter that secures a man's attention. We have already agreed that a poor opening will not offset the best of descriptions and arguments. You must get the man's attention first, in order to lead him to a description of your proposition. And the description is every bit as important as the opening, for, suppose your introduction to be 100 per cent perfect, what good would it do if your proposition were not well stated? It's like a man introducing himself as a first-class horseshoer and then proving himself not even an apprentice before working five minutes in the shop. Suppose, for instance, that we are selling potato diggers. We write a letter something like this, as a rule:

Dear Sir:—The potato-digging season is here. You want to harvest your crop just as cheaply and just as quickly as possible. If you can save the cost of extra hands you want to do so. I have a fine line of potato-diggers to offer and would like you to call and see them. The price is right and so are the goods. Better let me show you how you can save money on your potato crop.

You've read letters like that, and, no doubt, you thought them fairly good business-letters. But, suppose we write the man along this line:

Dear Sir:—Just out of town—about three miles—there's a man who saved the wage and keep of two men and a team during potato-digging season last year. And he made this saving simply because he purchased one little machine—not a steam tractor, either.

And that's why this letter is worth real money to you. For it tells about a little two-horse-and-one-man machine that will pay for itself in one potato harvest. And do its work quicker, easier and more thorough than four horses and four men without this machine.

Isn't that better? Doesn't that get the man's attention and hold it? Of course, you must know something about your goods to write a letter like that. But how can a man hope to sell anything if he doesn't know his wares?

When you write a letter soliciting trade you can't show your goods or work, but you can describe your goods and work. In fact, you must depend on description; and your description must be such as to picture the article in the man's mind, not alone as a tangible article, but as a money-saving or profit-increasing or labor-saving machine. You must describe its usefulness in such a way as to burn these qualities into his mind so they will never fade. You must treat the subject from his standpoint. For example, when you want to sell a man a pleasure vehicle of any kind, from a bike-wagon to a touring car, you don't try any profit-increasing arguments on him. You talk quality, easy-running, comfort, durability, etc. When you want to sell a manure spreader, you talk about its ability to save money, its simplicity, durability, and you especially emphasize its money-saving, profit-increasing qualities. In each case you talk from the side that interests him.

When you know what interests your man you'll have little difficulty in arousing his interest. And that is exactly your problem in soliciting business by mail.

Now, let us read a few examples of actual methods of getting and holding the prospective customer's attention. I have tried to cover several branches of the smithing business in these examples:

Dear Sir:—About your horses?

You want them kept in the best possible condition—in condition always to give you their best possible service. And the horse's one and only service is to pull.

But he can't do it with poor feet.

INTERIOR OF MR. BROSTROM'S GENERAL SHOP OF MINNESOTA

To deliver the best possible service, your horses must be shod correctly—scientifically.

We've been at this business—the scientific shoeing of horses—for years—thirty of them, to be exact. And we know, etc., etc.

Now, let us take another line—that of general repairing of farm implements. First, we get the man's attention, and then we hold it:

DEAR SIR:—You hear a lot these days about things not being done as well as they were years ago. And you have, no doubt, often wished you knew of someone to make or repair things right.

Bring your next repair job to Thornton's. In thirty years of repairing, not one job has left this shop that did not measure up 100 per cent. We repair work to satisfy the customer. If a perfect job cannot be done, we won't touch it at all.

Now, suppose we are pushing a certain brand of axle grease, or lubricating oil, or hoof ointment. Ninety-nine smiths out of a hundred would begin to shout about the "best" and "greatest" and "biggest," and by the time they wrote "Yours truly" they wouldn't know what they had said and, what's more important, whether or not it was true. Now, on the other hand, suppose we have looked carefully into the axle-grease field (as we certainly should if we want to sell the best), and have compared the various makes and brands. Then we choose the make that we know is best for all-around use. And when we talk or write about it, we know what we're talking about; for instance:

DEAR SIR:—Did you ever read an advertisement for axle grease that didn't say that that particular grease was best? They all say the same thing.

But—did you ever hear any maker say his grease was better than "Kyro Axle Grease"? They can't—I know there isn't a better brand of grease for the purpose.

I tested them all out before I tied up to any brand. If I had found anything better, I would be handling it.

I know "Kyro Axle Grease"—I found it best—you'll find it best.

TWO SOUTH AFRICAN MINE SMITHS. PHOTO SENT BY MR. L. G. REID, OF ORANGE FREE STATE, WHO STANDS ON THE RIGHT

Now, just another word about getting and holding the reader's interest. When you have your man's attention, follow it up by continuing to hold his attention by appealing to his interest.

AROUND OUR FORGE FIRE

The Editor was busily at work on some proofs when Benton happened in for a chat.

"Hello, Benton!" exclaimed the Editor, as his visitor entered and seated himself in his easy chair. "I've been looking for you for several days—just about time you got around to us."

"Well, I've been trying to get over for some time, but, you see, Perkins, of the National, wanted me to take care of his customers for him while he took a little vacation—so, you see, I've been pretty busy."

"I didn't know you were a salesman, Benton," returned the Editor. "How much of a road experience have you had?"

"Well, I was on the road for the National people for several years after I left the shop," replied Benton. "You see, I was a fairly good hand at most anything mechanical, so they put me on the road as trouble-man. But, after a time, I got to know the line and, while straightening out trouble jobs, sometimes took an order or two. Then they put me at selling, principally, and trouble only when in my vicinity."

"You must know something about selling, then," put forth the Editor. "Perhaps you can let us have a pointer or two on salesmanship."

"Yes, I'll admit, I do know a little about salesmanship," and here Benton paused to light a cigar. After settling himself comfortably in his chair he continued, "of course, you understand that the same principles applied by the salesman on the road may be used by the clerk behind the counter and the man beside the forge. Take, for instance, the smith who besides doing a general repair business carries a line of farm implements and vehicles. While that smith is blowing his fire, preparatory to repairing a customer's buggy or wagon, he has an excellent chance to talk up a sale for something he knows the customer needs.

"In every sale, whether for a threshing machine or for a wagon jack, there are six things necessary, i. e., the seller, the buyer, the goods, the agreement, the payment and the delivery. Now, suppose you have the customer or buyer in the shop. You know that he needs a manure spreader—that's the goods. You have learned about his needs, because you are keeping your eyes and ears open every minute of every day, and when anything is dropped by anyone, and that anything is likely to be of use to you, you immediately store it for future use. In this case you have probably been out driving or walking and have seen this customer's men spreading manure by the pitchfork method.

"You, therefore, introduce the goods—the manure spreader. You introduce spreaders in general, and then name your make—the kind you sell in particular. You describe that machine. You tell him how much easier the manure spreader does its work than he can do it by the old pitchfork method. You tell him how evenly it spreads the fertilizing material; you show him how simple it is to take a load of manure at the barn, drive to the field and, by the simple twist of the foot or wrist, to spread the material evenly over every part of the field, and to spread it just as thinly or as thickly as he desires. Then you show him how it actually pays for itself, in that one man with one team can do the work usually done by from three to four men with two teams, using the old method.

"If you have a spreader in the shop you show him how strongly each part is made—how simple to operate—the light draft—freedom from complicated gearing. And you drive each argument home by talking earnestly, convincingly and truthfully— as though you knew what you're talking about and that what you say is so.

"And if you have talked up the goods right, have convinced your customer that he wants that particular spreader, you'll not have much trouble in persuading him to buy. And then comes your agreement, payment and delivery.

"In summing up: first, you introduce or call attention to the goods. Secondly, you describe the goods and awaken his interest. Third, you create in your customer a desire for the goods, by showing him by actual example how he can save money or save time or labor by using what you offer. The fourth step is to persuade the customer to buy—to induce him to purchase. And, then, you clinch the sale—you get the customer to act.

"Of course, that is the ideal way—to bring a custömer step by step to purchase. Sometimes it is impossible to lead him on in this way. Then you have to treat him as a special case. There are all manner of customers and as many ways of meeting them to make a sale. You must serve your sales-talk to suit the customer. Serve it hot to customers that want it hot and cold to the cold customer. And you may as well quit at the start if you get your customers mixed."

"Well, Benton, you have it right down to a science," said the Editor, as Benton finished. "Some day I'm going to call on you for more talk along the same line."

The Shy Muse.

W. O. B.

The Muse is deaf and dumb today—
The pen of thought is dry—
Poetic themes have turned to clay—
Pegasus soars too high.

No rhymes to Tardy can I write.
His shop and forge so drear
Have aided oft' with labor light
To fill the column here.
My love for that old anvil cold
Has grown—I know not how—
I've labored hard—it must be told
Some other time—not now.

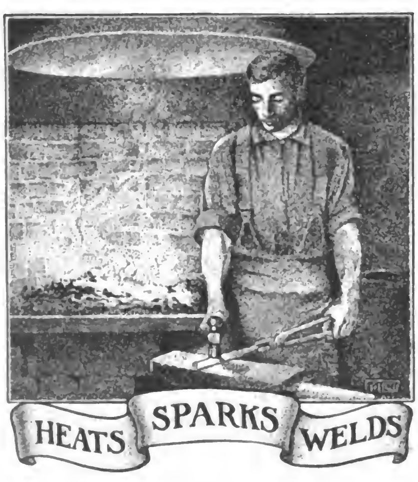
At "Tearin' Down the Shop" I tried—
Tried rip it to a shred—
To rip off verse I tried and tried,
But ripped my brain instead.
At "Jes' a Smith" I took a fling—
Thought it would be a hit.
I couldn't get the rhyme to swing,
Couldn't make it go a bit.

"The Pictures in the Smoke" have fled—
The scenes of olden days—
The forge and fire glowing red—
Have vanished in a haze.
You've had an introduction to
"The Man Behind" before.
Of him to speak again to you
Would prove me but a bore.

"The Ranchman's Favorite" saddle mare
May be a wonder horse,
Of Morgan breed or Arab rare,
But she has run her course.
I puzzled o'er "The King of Steel;"
I thought—"There's none more true
Than he who shapes the rail and wheel,"
No rhyme to him is new.

And then I thought of "Toiling Jim,"
Who built a shop so fine.
But he's so busy "hammerin',"
For me he had no time.
Then "Swazy Shop"—you've heard of it—
On it I tried some verse;
I tried and tried, no theme I hit,
Bad effort grew still worse.

Oh! for a call from Muse so dumb—
A pen that can't run dry.
Oh! for a theme that will not come—
For wings with which to fly.



If married to easy-going methods, get a divorce.

A "sputtering" man, like a "sputtering" lamp, is no good.

A good horse's feet are often saved by a wise shoer's head.

A mighty small smile often breaks up some mighty big clouds.

When satisfaction comes in at the window, progress goes out at the door.

Don't forget to remember that there are lots of customers who do know what they want.

True—competitors are often mean. But remember you are your competitors' competitor.

We know we can help you if its along smithing lines. Tell us—it's our business to help smiths.

Real economy is the saving of what you get for the money you spend, and not alone the saving of money.

It isn't always the price that keeps the customer from returning. Quality is more often the deciding point.

Forty years' experience may mean little or much. It's not so much length as it is breadth of experience that counts.

Before that big fat roll of harvest money is tucked away where you can't get it, see that your farmer customers pay up.

The shop, its condition and equipment is likely to give one a very good idea of the owner. Does your shop give customers a correct idea of you?

Don't wait until things get so bad that they must improve. Write to the Secretary today—just ask for "Easy Plans." And do it now—a postal will do.

Uncle Billy Martin says: "Sum men air so gol durn busy knocken' thur nayburs thet thay kan't hear oppertunity knocken' et thur door."

To get a true face on your work you must have a true face on your grinding wheel. Use the wheel dresser just as often as necessary to keep the wheel true.

Know a smith who doesn't know about The American Blacksmith? Help him and help us, too, by sending in his name and address. A post-card will do.

Paper belting for power transmission is being made in England. It is claimed to be stronger than leather, less subject to climatic changes and will not stretch.

It's commendable to set a price on your work and then to stick strictly to it—but when costs go up, your own selling prices must go up, too, if you are in business for profit.

All of us cannot, of course, be prize-winners, but that is no excuse for our not trying. We can't get all of the trade in our neighborhood, but we can certainly try for more, continually.

That Honest Dealings paragraph has stood these many years and means more today than ever. Read it in this issue. It means a fair deal and a square deal for every one of "Our Folks."

Put a copy of "Our Journal" in your pocket when you call on your neighbor. Let him read it—show him the articles of particular interest. Chances are that what interests you will interest him.

Vacuum machines are being used for drawing dust out of carpets and house-furnishings—wonder if one would work successfully in drawing greenbacks out of the pockets of delinquent debtors?

Do you know that we are now giving "Our Folks" three hundred and twelve pages of solid reading matter each year, instead of the two hundred and forty pages of several years ago? And at no advance in price. Tell your neighbor.

Nine years old is "Our Journal." You, who have been constant readers all these years, just compare our first issue with this number. Have we progressed? Have we improved? And you're paying the same price today as you did nine years ago.

It's poor business to fatten one department of your business on the profits of another. Make each department pay—a finger on the pulse of your business will enable you to know which departments are paying and which are feeding on the profits of others.

"Sleep is a mighty fine thing," said Tom, as he yawned and stretched, then pulled himself out of his chair. "Yes," said the impatient customer, "but there's a time and place for everything." The customer, you see, had found our friend Tardy asleep and the morning half gone.

A bill paid when due never gets to be an old account and, you know, the older an account the harder to collect. Keep your bills from getting to the old-account stage. Keeping continually, persistently and tactfully after those who owe will keep outstanding accounts at low-tide, always.

Have you missed any of the good offers made by our advertisers? Are you sure? Better go through the advertising pages again. There are several good offers and many side-line suggestions. If you can care for a side line, better do so. It means extra profit to you, a fatter pocketbook, a bigger bank account.

Another faker has just got the best of our friend, Tom Tardy. You see, Tom takes several trashy papers ("because they're cheap," he says) and, as he has a weakness for answering trashy ads, he sent a dollar to a man whose ad read: "Send a dollar and learn how to keep flies, mosquitoes and other insects from bothering you at night." Tom received a little printed slip which read: "Kill them before you go to bed."

When you think of it, it isn't much to ask, is it? Just one new subscriber from each present reader. Just ask your neighbor, or the very next time you see a blacksmith. It isn't necessary to know him. If you know he's a smith let "Our Journal" introduce you. Even he, whom you think your worst competitor, will be glad to know about "Our Journal" and, chances are, an introduction to it will lead to a better understanding in a business way. Just try this.

If a stranger handed you a little wooden box, said it contained a solid gold watch, worth twenty-five dollars, would you hand him the five-dollar bill he asked for? No, of course not. You would want to open the box to see what you were getting. Yet, some men will sign their names to papers without reading them. And often they would get off cheaper if they handed a ten-dollar bill right over to the man who asks them to sign. It's poor policy to take a stranger's word for fact. Remember, even a court cannot protect you when you have signed your name to a paper saying you will do a certain thing.

American Association of Blacksmiths and Horseshoers.

Have you started that association movement in your county? There's no better time than right now, just before the busy season begins. Just at this time you'll have demonstrated to you the many advantages of organization and better prices. Just at this time the advantages will be demonstrated in a forcible manner. Even a raise of but a few cents will mean a fatter pocketbook after the busy season. And the raising of prices is only one of the advantages to be gained through an association.

But, you say, how can I raise prices?

When "the butcher, the baker and candlestick-maker" raise prices, do they ask you anything about it? When the butcher raised his price on some cuts of pork from twelve cents per pound to twenty and twenty-two cents did he ask you if you would pay it? When the baker cuts down on the size of his loaf, does he ask you if you would stand for it?

No, sir. He knew his staying in business required the raise in prices and he raised his prices. If you didn't like it you could buy cheaper cuts and bake your own bread.

The situation in blacksmithing is the same. Your supplies have steadily advanced. Practically all stocks used by the smith are costing him more money today than they did two and three years ago. But is the smith getting more money for his work? Have the blacksmiths' prices advanced the same as the butchers', the grocers', the drygoods men's? Some smiths have advanced their prices, but the great majority are still adhering to prices that were in force four, five and even more years ago. And you know, Mr. Reader, that the series of advances made in smithing lines the last few years have just simply wiped out profits on old-price schedules. How long is the craft going to stand for this sort of thing? How long can they stand it? Is it any wonder that old smiths work from week to week and month to month with the same old equipment and in the same old shops that their fathers and grandfathers did before them? Is it any wonder that they are compelled to work like beavers in their old age, instead of resting after years of toil, as they should? Is it any wonder that apprentices are hard to get? Do you enjoy the prospect of a life of continuous toil and hard work, until you are so worn out that you are simply compelled to lay down your hammer?

An organization is the solution to all these problems. Protect your interests by the best possible method of protection—that of united effort. Join hands with your fellow-craftsmen. And you get full and complete directions for starting the good work by asking me for my easy plans. A postal will do.

THE SECRETARY.
P. O. Box 974, Buffalo, N. Y.

Trade and Technical Education in Other Countries—11.

W. H. DOOLEY.

Ireland.

Few persons outside of Ireland are aware of the extensive provision made for industrial education in Ireland. This matter is considered of such importance that a sum of no less than a million dollars is spent annually for this object, and that with a population not very much larger than that of the State of Massachusetts.

The technical instruction in Ireland falls under the following divisions:

First: Drawing and manual training in primary schools.

Second: Experiment, science, drawing, manual instruction and domestic economy in the day secondary schools.

Third: Training of teachers for technical schools.

The Irish people by nature are a manufacturing class. The island is full of natural resources, undeveloped, but through jealousy and heavy taxes, her industries have been stifled. In order to increase the size of the multitude of small industries there are local organizations, formed within a few years, called industrial development associations. Their aim is to get every man, woman and child to purchase goods which are at present made in Ireland. The demand thus created will lead to the expansion of existing industries and others will naturally be brought into existence. Labor must be educated, as a good journeyman is the result of two things: technical education and subsequent shop experience. In order to train along technical lines it is necessary to have well organized technical classes. The government, since 1899, has been organizing these schools and classes under the Department of Agriculture and Technical Instruction.

In the field of industrial education the main work of this work is to provide instruction for those who have finished with the elementary or intermediate schools, and who are already engaged in some employment or are obtaining advanced education in some higher institution. The vast majority of persons who are to be provided for, as in America, have but the elementary school education, and yet, in order to obtain the highest results, their education must be carried on to quite an advanced stage. In order, however, to benefit most from the technical schools, a preliminary, practical experience is necessary. This can be obtained by boys in the lower schools, by woodword, drawing and elementary science education, and in the country schools by elementary agriculture.

At Dublin the technical school is housed in a magnificent building. The school provides evening schools, and during the summer courses in carpenter work, glass blowing and drawing. These summer courses have been carried on for several years, as they have a marked influence upon the communities in educational matters. The students are given an examination whenever they feel competent to pass it, and if they fail they are allowed to return for the succeeding summer. For the preparation of men to teach trades in industrial schools, day courses throughout the year are provided. These schools are in operation during the winter months. After passing the necessary examinations these men are eligible for positions in the industrial schools which are now being rapidly established.

The provision for the training of teachers for the special schools is an important feature of the Irish technical school system. Schools for teachers have been opened up in Dublin, Belfast and Cork. In order to offer opportunities for ambitious men with a practical training to obtain a suitable preparation for teaching, a fund is provided, from which $3.75 a week can be allowed to each person of this character who desires to become a trade teacher, but who has not the means to stop work and pursue his studies to this end. A school of this character is much needed in every State in the United States. Anyone who has had an opportunity to look for trade teachers knows how difficult it is to find them.

On the other hand, summer schools are provided for teachers already in pedogogical harness, and who desire to obtain the necessary training to enable them to give certain instructions in the industrial schools. The summer courses are held during July and August at various places in Ireland, and they provide instruction in woodworking, metalworking and woodcarving. This training of teachers who have had scientific education is taken advantage of by

THE EXAMINATION HALL IN TRINITY COLLEGE, DUBLIN

several hundred persons. Teachers who attended the whole course were allowed about $17.50 towards their expenses of living at the centers, and when they travelled over twenty miles to the center were allowed third class fare there and return.

One of the best organized industrial schools for the boys between fourteen and sixteen whose parents are unable to support them properly is the Industrial School at Dublin. There are eight hundred boys attending this school. The school is in charge of the Christian Brothers, and the Government pays about $1.75 per week per capita for the board and care of these boys. The school is admirably equipped for the teaching of trades; among which are spring-bed making, sheet-metal work, carpentry and joinery, cabinet making, farm carpentry, blacksmithing, mason work (a concrete building being in course of erection by the pupils), tailoring, harness making, saddlery, shoemaking and various other industries which would be useful to a boy whose home is in Ireland. The finished product is sold at the market prices. Most of the graduates of this school come to the United States and receive from twelve to fifteen dollars as a beginning wage.

In Cork there is a school intended to correspond in a general way with the municipal schools in Dublin and Belfast, but it is not for scientific training only; art and music are also taught. In the scientific department the equipment of the engineering workshop is complete, and thorough training is offered in mechanical engineering. The electrical laboratory also is equipped with high-class modern apparatus, and an electrical engineering student can get a sound practical training in the groundwork of his profession.

The courses offered include: mechanical engineering, carpentry, building construction, plumbing, painting and decorating, practical mathematics, including practical and plane geometry (this geometry being very valuable, as it includes graphical statics), chemistry, boot and shoe manufacturing, physics, dressmaking, millinery, plain sewing, cooking, gardening and botany.

Another school that is situated in Cork and that is doing excellently is the Monastery School, conducted by the Christian Brothers. This school corresponds to a manual training high school, but it is an improvement over any of the normal training or technical high schools in our country. In the theoretical department of this school the walls are lined with cases which contain a complete history of all the industries of Ireland, from the raw material to the finished product. The finished work of the shops is of a high order, including carpentry and machine shop work, and the result of experiment work in a well equipped physical and chemical laboratory. The pupils of the school are day pupils only, and readily find positions upon graduating from the school.

The City of Belfast opened the municipal technical institute in 1907. This educational institution was rendered possible through an Act of Parliament, allowing a local tax of a penny per pound (two cents per $4.86) of valuation assessed for the institute. This produces over $5,000 annually, and the Department of Technical Instruction makes a grant proportional to the population of the city. The building occupies a very advantageous site in the heart of the city and contains twenty-eight rooms. The courses are similar to those conducted in the other institutes.

The labor unions and other trade organizations have taken an enlightened view of the institute's operations and have encouraged apprentices and young journeymen to avail themselves of the facilities provided, especially in the country classes. Much encouragement has been given by employers, a number of whom pay all or a part of the tuition

EXTERIOR OF TRINITY COLLEGE IN DUBLIN

THEY MAKE SOME BIG WHEELS IN MICHIGAN. SOME OF MR. G. W. M'NALLEY'S WORK

fees of these employees. All such are furnished with monthly reports, showing the progress of each employee paid for.

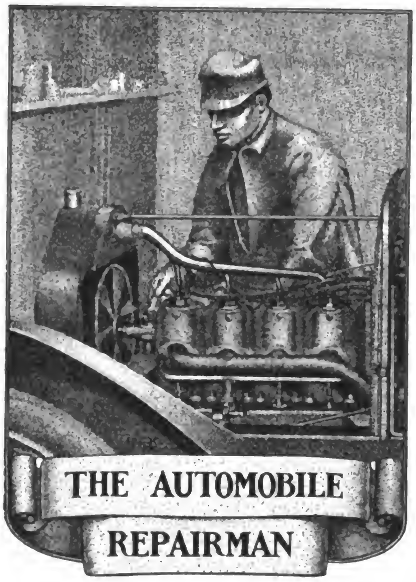
There are thirteen departments in the institute, all fully prepared with the necessary appliances for the technical education of the pupils in the several branches of study. First: a day technical course for mechanical engineering, electrical engineering, textile industries and pure and applied chemistry. Second: trade preparatory schools intended for industrial occupations. Mathematics for those who desire to study the science to help them in technical work and for those who desire to study the science without reference to its application to engineering. Fourth: mechanical engineering. Fifth: physics and electrical engineering, with ten schoolrooms. Sixth: a physical and heat laboratory. Seventh: an elementary laboratory illustrating the theory of electricity and magnetism. Eighth: a building trade department. Ninth: textile industrial department for handling and spinning flax. Tenth: chemistry department, with instructions by lectures and the laboratory on bleaching and dyeing. Eleventh: commercial department with accommodations for the simultaneous instruction of five hundred pupils. Twelfth: a school of art occupying the whole upper floor of the institute. Thirteenth: a women's work department, teaching cookery, dressmaking, millinery, laundry work and lace making.

The chief aim of the instruction is to present those principles of the arts and sciences which bear upon the trades and industries of the district of Belfast either directly or indirectly. Pupils of both sexes are to be admitted to all departments, and any properly qualified taxpayer is privileged to receive instruction. Not only is the instruction of the artisan provided for, but also of those who are preparing themselves for the work of the foremen, managers and employers.

In addition to the day and evening classes already established it has been found necessary to establish a trade preparatory school, which gives day instruction for boys who had finished the regular national school and wished to make preparation for entry upon some trade or industry. This school, which is regarded as a junior section of the day technical division has been most successful.

The school is intended to provide a specialized training for boys who are intending to enter industrial occupations. At the same time due regard is paid to the subjects of general education, special attention being devoted to the elements of science and the application of science to the local arts and manufactures.

Applicants for admission must not be less than twelve years of age; as a matter of fact the average age of entrance is thirteen and one half years. The course covers a period of four years.



Talks with the Blacksmith on Gasolene Motor Troubles.

J. N. BAGLEY.

At the present outlook the blacksmith is confronted by one of the greatest problems he has had to deal with in a number of years, and that is the repair of the automobile and the gas engine. Can we refer to a craftsman who is more deserving of the business than the blacksmith? In the first place he takes to it naturally, because he is continually handling the tools that are necessary in making the repairs. He is acquainted with almost any kind of machinery that the farmer uses. Why, now, should the blacksmith not fit himself to care for the automobile that the farmer is taking to like the proverbial duck to water. At the present time there is in the neighborhood of eighty thousand automobiles owned by the farmers alone, and if the present rate of increase continues—which it must—the blacksmith will be the man for the repair business, because he is "in on the ground floor."

In order that we be successful with a machine we must first understand the workings of it. In repairing the gas engine this will be the first thing to be considered, and when the how and why is known the rest is easy.

The accompanying diagrams show plainly the workings of the gas engine (four-cycle) as applied to the modern engine of the present time. In the beginning, the gasolene engine for successful operation is dependent on two things: First, a charge of gas must be drawn into the cylinder of the engine; second, this gas must be ignited after it has been taken to the combustion chamber of the motor.

The principal parts of the gasolene engine may be summed up as follows: A cylinder, the piston and rings which fit into the grooves in the piston head, two sets of valves (one to admit of the mixture to the combustion chamber of the motor and one to allow of the burned gases to escape), a crankshaft and a connecting rod, which is connected to the piston head by means of a crosshead pin and a flywheel, whose function is to insure steady running as well as to store up energy during the working or impulse stroke to carry it over the idle or compression stroke, of which we will learn more later. These parts referred to are of the motor proper, while such parts as the coil, batteries, carburetor, etc., are classed as accessories. A part which we might class by itself is the muffler,

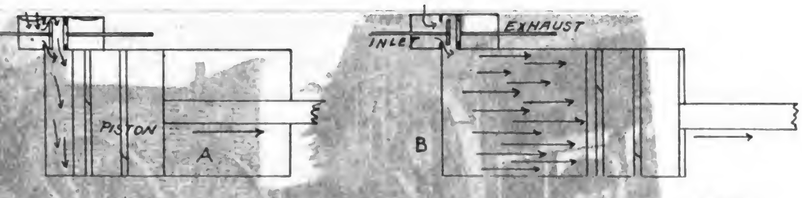


FIG. 1.—SHOWING POSITION OF VALVES AND PISTON AT INTAKE PERIOD

which in no way affects the running of the motor and is used to deaden the sharp sound that comes from the engine when the burned gas is expelled from the cylinder by the piston.

In Fig. 1 is shown the position of the valves and the piston at the intake period. As the piston starts on its outward travel it creates a suction in the compression chamber and opens the admission valve; this action draws a charge of gas and air from the carburetor or mixing valve to the combustion chamber. At the end of this stroke the suction ceases and the admission valve closes, after which follows the compression period, as shown in Fig. 2. At this time both valves are closed, and the piston compresses the charge that has been drawn into the cylinder by the first or intake period. At the end of this stroke, or as shown in E, Fig. 3, the explosion takes place. This action drives the piston outward with great force. The piston is connected to the flywheel; thus power is the result. As the piston holds the position shown at G, in Fig. 4, the exhaust valve opens and the piston forces the burned gases out. At the end of the stroke the exhaust valve closes and the operation is again gone over from Fig. 1.

Gasolene is one of the many hydrocarbons obtained from the crude mineral oil or petroleum. It is separated from the crude oil by what is known as the process of distillation. This process, to make plain, may be compared to the generating of steam from water. Crude petroleum or mineral oil when subjected to heat will give off in the form of a vapor a product known as gasolene. The degree at which this product is given off is comparatively low. Benzine, kerosene, naphtha are obtained in the same manner. Various degrees of heat will separate the distinct products. After these lighter products are separated there yet remains the thick, oily liquid from which many different lubricating oils are prepared for use with machinery requiring an oil of their nature. Owing to the low degree of heat necessary to produce gasolene from the crude oil it makes it a fluid that is very volatile and easily vaporized in warm weather; therefore, it is very hard to confine in such a way that evaporation will not take place. The gasolene engine will operate on gasolene testing as low as 60 degrees and upwards to 80, while it is not advisable to use a test as low as 60 degrees. The low grade of gasolene commonly known as DISTILLATE and which tests from 55 to 57 degrees will operate the gasolene engine in a warm climate very successfully. Much of the dirt and sediment that gives trouble and found in the gasolene is due to the shipping in unclean barrels or barrels which have contained lubricating oils. Gasolene engines ofttimes refuse to operate successfully on account of this sediment stopping some of the small passages leading from the tank to the mixing chamber; consequently, it is necessary to drain all gasolene in this case and refill the tank. In case the engine has been long standing and is hard to start, the carburetor should be drained of the gasolene that has been left standing, as it has become stale and is difficult to vaporize.

Of course, if the tank of liquid has been found to be in the same condition, the only alternative is to empty it and refill with the proper quality. A number of fires have been caused by leaky pipes or leaky tanks, and if the person in charge has had no experience with such exciting things as these he will naturally leave the building on the run, leaving all to the mercy of the flames. In case of this kind never use water, as it only makes matters worse. Smother with wet rags if they can be gotten at conveniently. If not, use dust, flour or sand, but never use water.

Gasolene atomized or vaporized with the current of air as it enters the cylinder of the engine simply forms a gas, and this is transformed into power. It is gasolene before taken into the cylinder and gas after it has passed inside. This will apply to all other liquids of a like nature used with the gas engine. Therefore, it is necessary that some method be used to transform the gasolene to a gaseous state before it is useful with the gas engine.

Water in the gasolene will often prevent starting the motor and will always impair its efficiency. As water is very often found in gasolene, especially when the tank is low, it is advisable to have the tank supplied with a cock which will admit of draining without disconnecting the piping from the tank and removing the tank. The natural result of water in the gasolene is impaired vaporization of the gasolene, and the engine fails to start. If started it will run very irregular, skipping explosions and probably stopping after it has run a few revolutions.

In starting the engine after it has been left standing for some time it is well to flood the carburetor, causing the stale gasolene to flow out and a new supply from the tank to take the place, as a high test gasolene will lose its good qualities in a short time when exposed to the open air. It is not good policy to stand and crank the engine for half a day, condemn the maker and call the engine all the bad names found in the English language and finally at last discover that the gasolene supply has been exhausted and the tank has never been refilled.

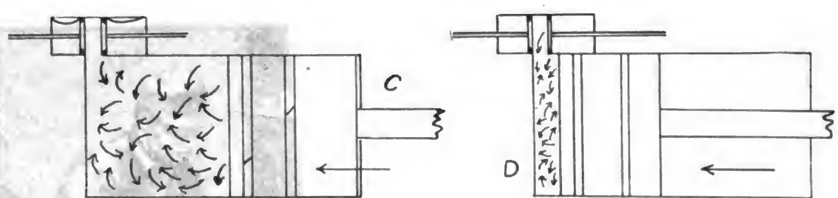


FIG. 2.—SHOWING VALVES AND PISTON POSITIONS AT THE COMPRESSION PERIOD

When gasolene is the fuel used with the gas engine there are two methods for bringing the gasolene to the engine, namely, the pump and gravity systems. The gravity system consists of piping from the elevated tank to the engine, which is on a lower level, and letting the gasolene down by the aid of valves. In this method the gasolene is supplied with its own weight; hence, the gravity system. If the gravity system is employed there is an admission valve on the engine at some convenient place, usually supported by a needle valve. The supply pipe, including the above named valves, is connected from the inlet port on these valves to the supply tank which is situated at a higher level

than the engine and in some convenient part of the building.

It is very essential that the valves used for this purpose are the best to be found, as gasolene is very hard to hold, and the valve should insure the complete shutting off of the gasolene from the engine when not in use. The pump system generally consists of a small pump fitted to the engine which is so arranged to be piped to the supply tank outside of the building. The function of the pump is to draw the gasolene from the tank and force it into the mixer of the engine when used, and when not in use to flow back to the supply tank, as will be explained. In this particular case the supply tank is located somewhere from 2 to 5 feet below the engine, and an overflow pipe is connected to it from the engine to allow the surplus gasolene to return to the supply tank. This tank is so arranged that the pipes will immediately be drained after stopping the engine or when the engine is not in use. The size of this pipe varies from ¼ to ½ inch, depending on the size of the engine installed.

At the present time fire underwriters require the pump system with the tank located at a certain distance from the building. They also require that the engine shall not be located where the normal temperature is above 95 degrees Fahrenheit, or within ten feet of a fire or in a closed room. The room must be well ventilated and have a cement floor, unless the wood floor is covered with metal and all drip oil wiped up clean at all times. If the engine is not enclosed in a building and sets on a wood floor the floor must be covered with metal for four feet either way from the engine. The oil feed·tank if used inside of the building shall not hold to exceed five gallons and must be made of copper or galvanized iron, not less than No. 22 Brown & Sharp's Standard Gauge. It must be double seamed and soldered and made to set in a pan so constructed as to catch all drip around the base of the engine. Where possible to do so, it is generally required that the tank be placed a specified distance from the engine house and the gasolene be piped to the engine and the pipe concealed under ground.

The object of placing the gasolene tank in the ground is to provide a cool place for it, which to a great extent reduces vaporization to almost a minimum. Generally speaking, the tank is placed in a hole outside of the building, this is bad practice. The proper way to place the tank under ground is to provide a chamber similar to a cistern and walled up with cement or brick, with ample room to care for the tank and make any necessary repairs without having to remove the tank to the open. This chamber should be so made that water cannot enter, as it should be dry at all times and in any and all kinds of weather. The best kind of tank to use under all conditions is made of galvanized iron, well soldered at the joints, fitted with a safety valve which will allow the escape of any gas that may accumulate to a certain pressure within the tank in the warm summer months.

A tank containing gasolene should never be placed in such position as to receive the direct rays of the sun. However, many do not adhere to this, and the result is an enormous loss of gasolene by direct vaporization, which loss is generally attributed to overconsumption of the engine.

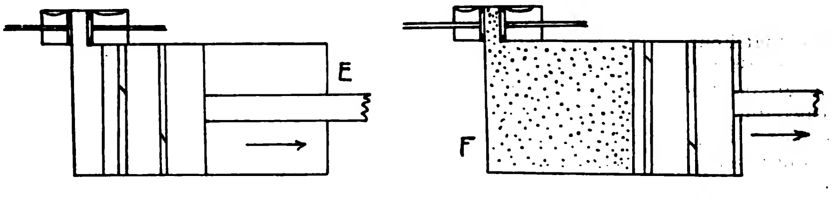


FIG. 3.—ILLUSTRATING THE EXPLOSION PERIOD IN THE CYLINDER

COMPRESSION as applied to the gas engine consists of compressing the charge of gas after admitting it to the combustion chamber of the motor. This action takes place with both the intake valve and the exhaust valve closed.

LOSS OF COMPRESSION may be found by turning the wheel over slowly. When little or no compression is manifest the power will not be good and many times the engine cannot be started with poor compression. Some of the following may be the cause of poor compression: A valve not seating properly, or perhaps the valve sticks in the guide; possibly cracked, the spring may have lost its tension. Valves many times need regrinding; this may be done by a little practice. (See grinding valves.) A valve ofttimes becomes pitted and will not seat properly. In case a spring loses its tension and a new one is not at hand a very good plan is to remove the spring and stretch until the proper tension is obtained. A leaky piston may be the cause. Worn or broken rings are many times the cause of poor compression. Possibly a gasket blown out somewhere. A loose or worn thread at the insertion of the spark plug. A lack of oil in the cylinder or a scored cylinder wall. Many times the cylinder rings will get in such shape as to allow the slots in the rings to get in line and the compression to escape past. In this case nothing will remedy but to remove and place them in their former position.

TEMPERATURE OF COMPRESSION will vary according to the speed of the engine. As the engine increases in speed the temperature will be higher and the easier the charge will ignite. The higher the temperature the more rapidly the expansion of the gases will take place, therefore causing a greater initial pressure on account of the lesser heat losses through the cylinder walls.

COMPRESSION AND ITS RELATION TO POWER is one of the important points to be considered at all times. With poor compression the power will be affected more or less. With a very poor compression and the engine running slow it will be practically worthless, while with the same compression and the engine running at high speed the power will be much better accordingly.

POOR COMPRESSION may be improved in a short time by caring for the valves, correcting the position of the rings, keeping the gaskets perfectly tight, screwing in the spark plug tight and such little things as are neglected until some future time because we are in a hurry. Poor compression means a loss of power and a waste of fuel.

COMPRESSION PRESSURE may be understood in the following way without an amount of complicated figures. Be it

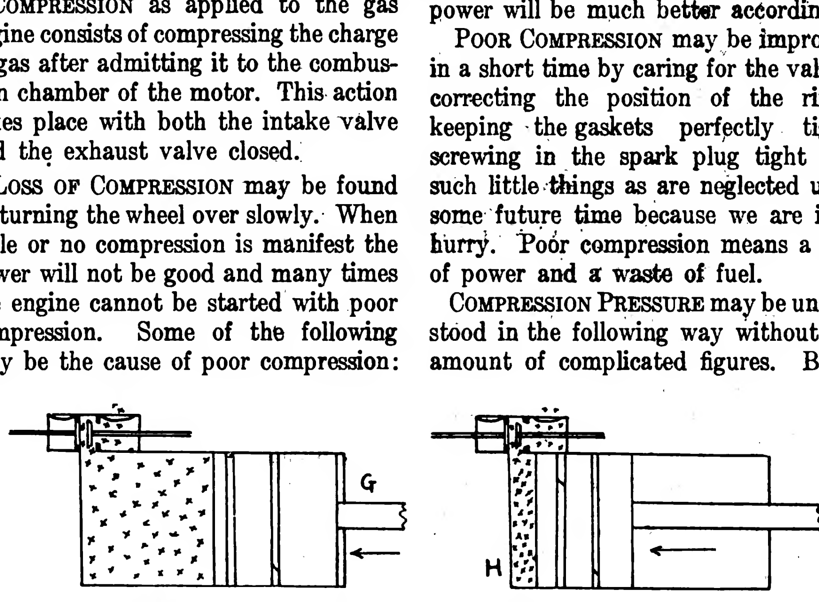
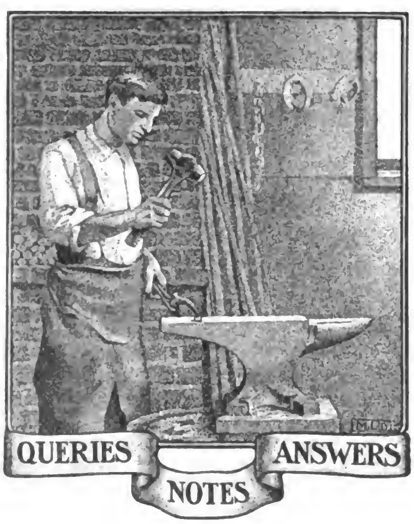


FIG. 4.—SHOWING HOW THE BURNT GASES ARE EXHAUSTED FROM THE CYLINDER

understood that it is necessary in figuring up the cylinder volume to consider all the valve and port space which, properly speaking, is a part of the cylinder. The principle to the engine of high compression is the premature or self-ignition under a full load. This not only destroys power, but causes an unnecessary amount of strain on the crank shaft. This may be termed High Compression Pressure, which is sometimes, but not always, the cause of self-firing. The fact of the case is, the high compression engines are scarce and this cause cannot be applied to the engine of low compression. However, many things may cause premature or self-ignition, as will be learned as we proceed to ignition troubles.

COMPRESSION CHAMBERS are a part of the explosive motor where the charge is compressed and fired, usually by the electric spark. The interior of this chamber must be at all times as smooth and free from soot as is possible to be and the amount of lubrication is one of the essential things to consider. If the dimensions of the cylinder or the combustion chamber is to be found by a simple method, the following will be of advantage. Fill the combustion space with water, then obtain the weight of the water in ounces which, multiplied by 1.72, will give the capacity of the combustion chamber in cubic inches.



Waterproofing Leather.—Can anyone give me a good receipt for making leather waterproof? JOHN ALMETER, Minnesota.

A Rubber-Tire Query.—Can someone tell me through THE AMERICAN BLACKSMITH how to put rubber tires on buggies and baby carriages? THOS. LONG, New York.

A Question on Stock Calculation.—I would like to know through "Our Journal" how to calculate the amount of stock of a given diameter, in order to forge a piece of a certain length of a smaller diameter.
NEW ZEALANDER.

Information on The Steel Square.—I would like some brother craftsman to explain the different uses of the steel square, as I am sure that there are a great many uses for it of which I am ignorant.
A. C. CRUM, Pennsylvania.

A Shoeing Query.—Will someone please tell me through "Our Journal" what shoes to use on a base-wide or a toe-wide standing position of the front feet. The horse interferes and steps on the outside wall first.
G. W. SMITH & SON, Pennsylvania

A Question for Horse Trainers.—Kindly tell me how horses are trained for pace and action, i. e., what methods are used and at what age does the training usually begin. An article on training for pace and action would be interesting. I should like to hear from a real trainer, not from a would-be trainer. D. M. MILLAN, England.

For that Foundered Mule.—I would suggest that Brother Ferrill feed the foundered mule ground feed twice a day with about a teaspoonful of powdered alum mixed with the feed. I have known of a number of cases of founder of long standing that have been entirely cured in this way.
J. N. BAGLEY, Kansas.

Wants a Good Sign.—I intend very shortly to put up a first-class shop in a new location and would be very glad if some brother would give me a good idea for a first-class sign for a general business—shoeing, gunsmithing, repairing, etc. I would be very grateful for such an idea.
J. T. MONCLA, Pennsylvania.

A Shoeing Question.—Can you tell me how to shoe a horse that interferes between the fetlock and knee of the forward feet? We have tried side weights and several different methods. The animal must be shod flat. The owner does not want any calks. E. A. MOUNTAIN & SON, Quebec.

Lubricating Liquid.—Brother J. D. Brown of Ontario, evidently refers to the mixture of potash and water used in drilling. I do not know the exact proportions, but he could easily tell what proportion of potash to use by experimenting. It may also interest him to know that lard oil is also used for lubricating drills.
A. E. RATTON, Pennsylvania.

A Gas Engine Kink.—Instead of supplying oil to the cylinder through an oil cup, mix one pint of oil to five gallons of gasoline and place this mixture in fuel tank. This gives a steady flow when engine is running and saves oil without extra trouble when lying idle. If your engine smokes with this mixture, cut down the proportion of oil. M. J. MALLORY, West Virginia.

A Trio of Questions.—(1) I should like to know how to tell a good piece of iron from a bad piece. I can, of course, tell by working, but is there not some way of telling by simply looking at the two pieces? (2) How can one tell a piece of steel from iron by simply looking at it? (3) Is there any rule to tell to what extent iron or steel will shrink when heated?
EDWARD CLAY, Pennsylvania.

On Welding and Painting.—I would greatly appreciate it if some brother craftsman would tell me how to weld shaft irons that have become broken. I can weld them, but in hammering the weld down it becomes too thin to hold. Would also like to know what kind of paint to use to stripe buggies, and how it is prepared. The only paint I can get will spread if made thin enough to flow, and makes the stripe too large.
T. J. STEADMAN, Florida.

Making the Polishing Wheel Work.—In reply to Brother Sullivan, of Oklahoma, would say he can put emery on his wheel by applying a coat of good glue to the wheel and then sprinkle emery flour on it before the glue dries and sets. If he desires to polish fine articles without the use of emery he should use polishing rouge or powder. Whiting is comparatively cheap and is a good polishing powder. When using, sprinkle it liberally on the wheel, or use as a paste and apply to the surface to be polished. H. G. HOEFNER, New York.

Contracted Feet and Vicious Horses.—I make the shoe for a contracted foot wider than the foot and begin driving the nails at the toe. Never spread a shoe after it is nailed on, as this is very injurious to the foot, often breaking the heel loose from the frog.

Our Wyoming or Montana Brothers ask in regard to handling wild horses. I still say I have always shod wild horses without rope and stocks. I never saw a horse in stocks until last winter, and that was because the man was afraid of him. If the brother will write to me directly and enclose stamp for reply, I think I can give him some advice that will help him.
L. E. PHIFER, South Dakota.

A Note on Horseshoeing.—I have shod a great many horses and have had some that I have had to tie. For saddle and light drivers I use extra light steel shoe with swelled heels and small nails, in order not to burst the hoof. I only trim enough away to get a good level down to the sole of the foot, and I never by any means cut the frog, as I think the less you disturb the frog the better it grows and better it keeps the walls spread to their proper position. I never put a hot shoe to a horse's hoof, as I think that kills the part of the hoof which it touches. I am of the same opinion as Mr. Casey, of Nebraska, and thank you and the brother smiths who send in recipes. CHAS. H. STRADLEY, Texas.

You Must Know How.—Some time ago I wrote you saying that the Brooks Cold Tire Machine would not shrink thin tires. I wish to retract this by saying it was my own fault and not the fault of the machine. I did not know how to operate the machine properly. Since one of the Brooks Machine Company's men showed me how to operate it I would not be without it for double what it cost. It will do just what they claim for it, or more, if possible, it will pay for itself in two years in the saving of wood alone, not to mention the time it saves. A tire set on it gives better satisfaction than the other method of heating and putting it on, and I can set four tires in twenty minutes.
J. T. WILSON, South Carolina.

Curing Shoe Boils.—To Mr. W. M. Curling, of Texas, would say that the name "Shoe Boil" is but another name for a sore on a horse's shoulder. I have always heard the latter called "Collar Boils," and they are treated in a different manner. I will give two methods that I have always used with good results in cases of shoe boils. First, wash the sore well with clean, cold water, and then cover the sore with dry sulphur.

Apply sulphur three or four times a week. Second method, wash well with clean, cold water, wipe dry and paint with white lead, such as is used fot paint. Spread it on thick, as it is cheap, three or four times a week. I have healed up bad cases in two weeks, and worked the horse every day. No rest is needed in using either method.

C. W. METCALF, Iowa.

A Short Talk on Shoeing Stocks.—In answer to Mr. W. E. Murchison, of Georgia, I wish to ask: "Does it pay to carry insurance on your shop or any other article or property?" Shoeing stocks, to my notion, are nothing more nor less than insurance against doctor bills, broken limbs, hard work and, last, but not least, worry. The worry to a man when a vicious horse comes to the shop is equal to a hard day's work.

I have a pair of Barcus Stocks, and if anything on earth pleases me it is to get a bad horse in them where I can handle him to suit myself. Some men can handle any horse and shoe him—so they say. We have a few of that kind around here who are not in business now, and responsible people have told me they were the first ones to back down from shoeing a bad one. By all means buy a pair of stocks—the Barcus suits me. M. J. MALLORY, West Virginia.

Some Woodworking Kinks.—My shop is 22 by 35 feet, two stories high. I have a four-horse gasoline engine, with which I run two circle saws and one wood-turning lathe. I have quite a run of work. I am located in a small village with three blacksmiths, but none of them do any wood work. I have worked at the trade for about fifty years. We don't get big prices, but we manage to make a good living.

I agree with Mr. Van Dorin, of California, in that the less gather one can put in a wagon axle the better the wagon will run. I have read that discussion with interest.

If Isaac Butterworth, of New York, will soak his timber for cutter runners in cold water for three or four days and then steam them he will find no trouble in bending them. The larger the timbers the longer they will have to be soaked.

O. W. CHEEVERS, New York.

On Redressing Axes and Mill Picks.—In reply to retempering question of Mr. Ira Beal, of Utah, who desires to know how to redress old axes, it is hard for a man to be successful in retempering old axes, as one does not know what kind of steel he is dealing with. If a blacksmith gets 75% of them to stand, he is doing fine. In order to draw the ax properly it should be heated moderately slow, so as to obtain an even heat and not burn the steel. Heat to a good red and draw out. Trim if it needs it, reheat and finish up with light blows. Let it cool and grind to temper. Have a vat of linseed oil, or fish oil, which is preferable, and heat to a good, cherry red and plunge into the oil. Leave it in oil till cool, then wipe oil off and polish. Temper to a purple that is almost blue—just soft enough that sharp file will take a hold of it. Now dip in oil, cool off, repolish, put in your handle and you are ready for business.

In tempering mill picks, in reply to Mr. W. R. Lancaster, I should advise him to use the same as for tempering axes, or use one pound of common salt, two ounces saltpeter and one ounce of alum to a gallon of soft water and draw to a purple. The latter solution is the better for picks.

C. W. METCALF, Iowa.

A Letter from Iowa.—I wish to thank Brothers C. W. Metcalf and Andrew Peters for their kindness in telling and illustrating the manner of pointing an old plow lay.

I have a small new shop, but a fine set of tools. I possess a two-horsepower International gasoline engine, a Monarch disc sharpener, an emery wheel, rip and cut-off circular saws, a Royal Forge, a Champion drill and Lightening full-mounted screw plates, a Hay-Budden anvil, a 75-pound steel vise, a Mole tire shrinker and numerous small tools all new. Will give you some of my prices.

Disc sharpening ....$2.50 to	$2.75
Pointing six shovels...............	2.50
Sharpening plows.......... .25 to	.35
Wagon tongue....................	2.50
Horseshoeing, 4 new shoes.........	2.00
Resetting old shoes	.25

and other work in proportion. I also took a course with Professor Rich on horseshoeing and got my diploma. I think his lessons and book are fine.

As to prices, I think all smiths should have a good price for their work. My motto is, "Do good work and charge a good price for it." Our tools and machinery wear out, and we will need to replace them. Besides, we will all grow old some day and should lay up something for old age. The accompanying engraving is of the power end of my shop.

FRANK W. PECKHAM, Iowa

Can You Beat This?—On January 3, 1910, I did the largest day's work I ever heard of any man doing. I write this to inquire the name and address of any man who has ever beaten it. Perhaps some one has, and I should like to hear from any one who has done or can do more in ten hours. I am prepared to send a sworn statement, verified by others as witnesses, that, on January, 3, 1910, I pulled off all the old shoes, except four, dressed the feet and all the shoes, drove all the nails,—in fact, did every bit of work myself, and at night I had put on ninety shoes. At noon, after five hours and five minutes time, I had on fifty-two shoes, having done all the work, pulling off all old shoes, dressing and sharpening every shoe, and driving them. In the afternoon I had two teams of very heavy horses, exceedingly bad to shoe, which took up more time than would have been required to shoe eight horses such as I had had in the forenoon. I can send proof through good, substantial men that I pulled off the old shoes, welded the toes, sharpened the heels and drove them on in fourteen minutes, repeating this three times in succession. In other words, I pulled off, sharpened and drove the shoes on three mules in forty-two minutes—twelve shoes in forty-two minutes. The timekeeper was Mr. William Shanks. I will be fifty years old on April 15, 1910. Have shod horses for twenty-two years, and am still learning. I would very much like to know the record of the world in time shoeing. E. E. MANN, Ohio.

MR. W. E. PALMETER'S GENERAL SHOP, OF NEBRASKA

A Letter from the Keystone State.—I think that "Our Journal" is the best help a smith can get on any subject of the craft. I will tell how it helped me.

I am a young smith, twenty-two years of age, and this is my third year at a fire. I work for a coal company. It was two years the first of last November that I started to work for this company in a shop of four fires, and the other smiths were all old hands that worked long for the company, and they did not like to see a stranger, and a kid at that, as they called me, step in and draw the same wages as they were getting. I was the subject of many a job and many a plot to work me out. Many a piece of burnt iron was fished out of my slack tub when the foreman was there that I had never before seen and, if anything came in the shop that was to be worked out to the hair, I was the one to get it and, if there was a bad job turned out, it did not make any difference who did it, I was the one to blame. But I soon got that fixed. I got a stamp and used it on everything that I did and I never let the stamp get out of my sight. And, with the help of "Our Journal," the "Queries, Answers, Notes," anything that I did not understand I had a way to find out. I have the Journal and the brothers to thank for my coming out on the top of the heap. I am the only one of the old force on the job with a raise in wages and a good name; therefore, why should the paper not be a help to the craft in all branches? A BOOSTER, Pennsylvania.

A Letter from Iowa.—As I have not seen a letter from these parts in your paper I would like to say a few words. This is a town of about one thousand inhabitants, with three blacksmith shops and one wagon shop. One shop is run by an old man who does scarcely anything, so it leaves it practically to two blacksmith shops. I have been here for four years, working out for two years and renting shops for two years. This fall I purchased the shop I rented the past year—a shop twenty-eight by forty feet, and containing a Fairbanks-Morse engine, two forges, one Little Wonder disc sharpener, Star Power hammer, emery stand, drill and other

necessary tools for a first-class shop. Here are a few of my prices: setting shoes, each twenty cents; Neverslips, each sixty cents; Neverslips, light, each seventy cents; plow sharpening, thirty-five cents; disc sharpening, twelve and a half cents per disc, and other work in proportion. I enjoy your paper immensely, and get much help from the different writers. I enjoy the talk on shoeing more than anything else, and although they do not all agree I think they all have some good ideas. We are apt to be selfish and think our way is the best, although the other fellow may have a way that is just as good and perhaps better. My competitor has been here for eighteen years and is an excellent smith. In working for him I found out many things I did not know, and now I have as much work as he has.

T. E. McCook, Iowa.

GENERAL SHOP OF E. S. MAPLE & SON OF INDIANA

To Better Trade Conditions.—How can conditions be bettered in the craft? How can smiths overcome extending credit, which is a death blow and keeps the smith more or less poor? These are questions that are much debated at the present time. I blame blacksmiths for all this trouble. In the first place, it is up to the smith to do the work; in the second place, it is up to him to make rules by which to regulate his business, and in the third place we want rules by which business may be run successfully. The way in which to do all this is to demand cash at each job. Here in the vicinity of my shop we have quite a number of truck farmers who cart one thousand dollars' worth of truck to market in their season, and this is a strictly cash business. I know some of these men who claim to sell ten thousand dollars' worth of goods a year and collect cash each day for all sales. Now, why is it that this truck business or trade is so much more important than the blacksmith business? Here is the reason: If the blacksmiths would adopt and enforce a set of cash rules, there is no reason why smithing should not become almost, if not wholly, a cash trade. It is a very important factor in daily life. When a team of horses is at hand, waiting to be shod, it is not a theory that confronts one, but a condition. One must know anatomy of the horse's foot and limb and must cope with nature in order to keep horses going sound. And I firmly believe so important a trade should be a strictly cash one.

Albert Meier, Pennsylvania.

Tempering Tools.—In answer to Mr. W. H. Tedford, of Tennessee, who wants to know how to temper chisels, plain bits, springs and axes, I would say that a very good bath for chisels and plain bits is as follows: salt peter, one half ounce; sal-ammoniac, one half ounce; soft water, one gallon.

Heat the tool to be tempered to a good cherry red and dip in the bath. Care should be taken in hardening the tool. When plunged in the bath it should be kept in motion, straight up and down, in order to prevent steam from collecting on the sides of the tool and warping or cracking, and should be held in the bath until cold. Then wipe off the water and polish bright. Be careful not to allow any grease to come in contact with the polished surface, or not to even touch the polished surface with the fingers, as it will prevent the color from presenting its proper appearance. Then lay on a hot iron and draw temper to suit the class of work in which it is to be used. For cold chisels, draw to a pigeon blue, and, for all-wood tools, draw to a dark straw color. Axes and springs should be hardened in oil, either fish or linseed. Tools that are hardened in oil may be heated a trifle higher than if hardened in a water bath, and should be left in the oil until they are of about the same temperature as the oil. Then remove and lay over a bed of hot coals until the oil burns off and the spring turns to a blue, and dip in the oil once more. When cold, they are ready for use. An axe should be hardened in oil, the same as with the spring, but it should be polished, and the temper should be drawn to a purple, not quite to a blue, The tempering of tools is a trade in itself. and requires a great deal of study to make a success of it. I hope this information will be satisfactory to my brother smiths.

C. W. Metcalf, Iowa.

A Good Talk on Cold-Tire Setting.—A brother smith of South Africa writes an article on setting tires cold. I would like to state my experience. In the first place I would explain that Northern California is one of the hardest climates in the United States on vehicles and vehicle wheels. The extreme wet in winter and extreme heat in summer make tire setting one of the greatest problems. Most of the wheels that come to our shop are in the condition first mentioned by our brother,—what we call rim bound, the spokes being loose in the rim. Such wheels as these are in need of repairing and the cold-tire setter was never intended to repair wheels. We would suggest to our brother that he try our system. First, we remove the tire with our Atwater tire puller. Do not hammer them off, as this splits the rims and breaks spokes. After the tire has been removed the wheel goes to the wood workman. Each spoke is wedged at the rim, and hub. If necessary the felloes are sawed out the proper amount and then the wheel is ready for the tire setter. After the felloes are sawed out the tire will slip on with ease. Now set the wheel in your cold-tire setter. Set your grips so that they will all take hold at the same time; have the brains in the head of the operator instead of in the machine, and when the tire is tight you have a better job than is possible by the old hot process. In setting buggy wheels we take out the bolts, wedge the spokes in the rim, saw out the rim, if necessary, put in one bolt to hold the tire in place, and when all four wheels are ready one man can set them cold in from ten to fifteen minutes. You may ask, "After going to all that trouble, why not set them hot?" First, show me a man who sets four tires in ten minutes; next, show me a man who knows the draft a wheel needs until the tire is tight. With the cold process you can tighten it just as much or as little as you desire. We use the Brooks Edge Grip Machine, and when we turn out a job the paint is not all burned off. The trouble with cold-tire setting is that most men endeavor to become rich from the first job, and thus spoil the wheels and the cold-tire setting business.

Wells & Johnston, California.

A Letter from Iowa.—I would like to tell my brother blacksmiths of my small degree of success. This is a small town containing one competing shop. I came here five years ago next May with very little money and but few tools, and the first year I did only about seven hundred dollars' worth of work. However, by doing good work and charging a good price for same, I am now doing fifteen hundred dollars' worth per year, and have a four-horsepower gasoline engine, a home-made power hammer, a grinding and polishing stand, a power drill press, a band saw, a tire bender, a tire upsetter, an iron shear, a lawn mower sharpener, a Barcus shoeing stock, a clipper knife sharpener, a disc sharpener, and I have ordered a punch machine which I am expecting soon. My engine runs the washing machine on wash days without any extra bother to me, as I have a friction clutch operated by lever at wash house for starting and stopping the washing machine. My shop is twenty-six by fifty feet, with one end partitioned off for a wood shop, which is fourteen by twenty-six feet. I rent the wood shop to a wood worker, and have been doing all the iron work myself, but now I think I will be compelled to put in another forge and hire help. At the present time I own the shop, house and three lots and have money to pay cash for all I buy. In regard to power in a shop, will say a man may not

make money with power, but I don't see how he can make money without power.

Here are some of my prices:

Shoeing, old shoes, each	$ .25
New, common, each	.50
Bar and racing	$ .75 to 1.25
Neverslips, per team	5.00 to 6.00
PLOW WORK—	
Sharpen lay, 14 inches	$ .30
Sharpen lay, 16 inches	.35
Sharpen lay, 18 inches	.40
Point lay	.75
Point shovels	2.00
Set buggy tire	.60
Set wagon tire	.50 and up.

Other prices are in proportion.

E. L. PARDEE, Iowa.

Shoeing and Automobiles.—I do not believe in tying down an animal to shoe it. I shoe everything, from oxen to goats, and find that a horse is the easiest animal to control. A little will-power is all that is necessary, once you obtain control of your horse's mind, and you will find no need of tying him. Brother Frank Casey, of Nebraska, thinks he had a difficult proposition, but in my mind it was the fault of Mr. Casey and the parties who owned the horse. I have gone into corrals, caught the wildest horses and shod them all around without assistance from anyone, and I am a mere baby beside Jim Jeffries, as I weigh only 165 pounds.

The best shoer and writer on horseshoeing, in my opinion, is Brother Frank Wenke. I have read his writings for several years in "Our Journal," and they show good common sense.

It seems to me that an occupation that requires less risk and less money is automobile repairing. There is a great deal more material good in the money that can be obtained through doing this work than the glory to be won in shoeing bad horses—and glory is all you can get from them, as they do not pay; though, to be sure, one cannot turn them down when one has out his sign.

I should like to tell the craft why their chisels become magnetized. The cause is this: After the steel has been rolled, the molecular parts run crosswise of the bar, and the constant jarring causes them to become rearranged lengthwise, and thus it becomes magnetized. In any case where steel is used and there is a constant jarring, magnetism is probable.

W. J. MCANERNY, Oklahoma.

MR. M'ANERNY DOES A GENERAL BUSINESS AND ALSO CARES FOR AUTOMOBILES

Forging Weather Vanes and Tempering Mill Picks.—I do not approve of Bert Hillyer's description of the forging of a weather vane—it is not practical. The making of the forging marked A and B, as he describes it, would task the resources of a clever smith, because in some shops the thing would have to be ready for fixing before anyone got it made. Solid forgings are all right for machines, but in this case why not cut off your round or square stock, weld collar on, drill and tap for arms and make top drop on not in, if I read the drawing right. In my method the part cannot get full of water and rust fast.

I do approve, however, of the way in which he describes the making of hooks, and the wrinkle of getting lengths for different hooks is worth a shilling or two to any man who has these things to make.

In reply to Mr. W. R. Lancaster, Tennessee, if he will look on page 204 of the May number he will see his query answered by L. B. Kent & Son, of New York. If that will not do, I am sending three receipts for tempering mill picks and chisels.

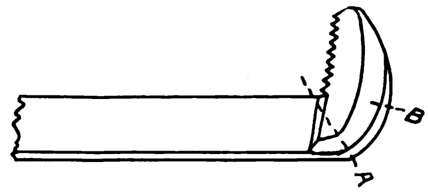
1. Heat the pick or chisel to a blood red and quench as quickly as possible in three gallons of water in which is dissolved 2 oz. of oil of vitriol, 2 oz. of soda and ½ oz. of salt peter or 2 oz. of sal-ammoniac, 2 oz. spirits of niter, 1 oz. of vitriol. The mill remains in the liquor until cold.

2. 1 oz. of white arsenic, 1 oz. spirit of salts, 1 oz. of sal-ammoniac dissolved in 4 gallons of spring water and kept in a tub or iron phial for use. Heat the tool to a blood red heat, then quench in this mixture, draw it gently over a clean fire till the spittle flashes off it, then let it cool.

3. To 3 gallons of water add 3 oz. of spirits of niter, 3 oz. of spirits of hartshorn, 3 oz. of white vitriol, 3 oz. of sal-ammoniac, 3 oz. of alum, 6 oz. of salt with a double handful of hoof-parings—the steel to be heated a dark cherry red. Used to temper chisels for cutting French burr stones.

H. R. BENSON, England.

To Temper a Jaw for Pipe Wrench.—The jaws of the pipe wrench need dressing occasionally, and in order to do the job successfully the temper must be drawn and the teeth dressed afterward. After the teeth have been sharpened, the jaw must be tempered again, or it will be worthless. The following way I have found to be a good one for hardening and tempering the jaw for the pipe wrench. Heat the jaw to a cherry red, as shown by dotted line A, after which cool by dipping it into the hardening bath and leaving it until stone cold. Polish the teeth along either side and it is ready to be tempered. To draw the temper, prepare a pot of melted lead



TO TEMPER A PIPE WRENCH JAW

and place the jaw into it, leaving about one half of the jaw out, teeth up. Draw the color to a light blue, and the jaw is again as good as new.

J. N. BAGLEY, Kansas.

Interesting Letter from England.—I have noticed lists of prices of the different kinds of work done in America and the States. Of course, I notice they have different names for their work than we have here in England; as, for instance, four shoes reset. I take it that means four removes; i. e., four shoes taken off, the feet dressed and shoes refitted and put on again. And a plow lay I take it means a plow coulter here. I will try and give you the prices for our work out here, six miles from a big city (Sheffield);

Four new shoes, flat	3 s. 4 d.	($ .81)
Four removes	1 s. 8 d.	($ .40)

Removes are always half the price of shoeing, as is also sharpening.

One coulter layed steel.	9 d.	($ .18)
One coulter layed iron.	6 d.	($ .12)
Ironing swingletrees, set of three	5 s.	($1.22)
Re-hooping set of tires, 4 in set	12 s.	($2.92)
Re-hooping set of tires, 2 in set	6 s.	($1.46)
New tires	2 £ 0 s. 0 d.	($9.73)
One set shoes, heels and toes	3 s. 9 d.	($ .91)
One set shoes removed	1 s. 10½ d.	($ .45)
One set shoes ring or round	4 s.	($ .97)
One set shoes with leather	7 s.	($1.70)
One set stud or calk shoes	7 s. 6 d.	($1.22)
One set stud or calk shoes, steel	10 s.	($2.43)

I also possess a line of business that is not found in one blacksmith shop out of a thousand, and that is socketing. It deals with a hook or agricultural implement [undoubtedly a sickle blade, Ed.] very much known in your country, as a good deal of my work comes your way. I do not make the hook, but put the socket or handle on it. The hook is made of steel and the socket is of iron; so if any of "Our Readers" see any of these hooks or sickles with the mark BY or IO on them, they can say that they have been done by one of their brother craftsmen in the "Old Country." I should like to hear from any of your readers who come across any of these hooks, as I would like to know what they think of them, and also of my price list. I also manufacture a lot of scythe fittings which go over to America.

STEPHEN COCHRANE, England.

A Letter from Tasmania.—One of the things I often deplored in my younger days was my inability to get anything good in print about blacksmithing. This was a great loss to me, as I had to practically learn the trade myself in a small country place, with very few opportunities of getting object lessons and nothing I could buy of much assistance. So I had to keep plodding on in the face of great difficulties. I am thankful to be able to say that I finally overcame these and have been in business here for over 23 years.

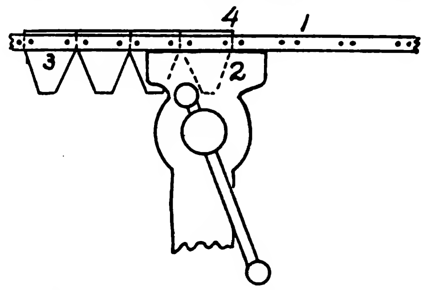
When your sample journal or number found me out I welcomed it as filling a long-felt want, and immediately sent you payment for a subscription for five years, and consider it one of my best investments. Aside from the splendid information it gives as to how different work is to be done, the advertisements are of immense benefit to readers. They are, in fact, an education in themselves, telling of the latest tools and machinery pertaining to the trade, and I am, to a certain extent, indebted to what I read in The American Blacksmith for some of the tools and machines I now possess.

Prior to purchasing equipment for my shop, I addressed about a dozen American firms who advertised in "Our Journal." I received catalogues which caused me to be more than ever interested in up-to-date tools and machinery, so that later I purchased the equipment which I now possess. My plant consists of the following: One 5-horsepower oil engine; one iron saw bench with rising and lowering table; one 12-inch buzz planer; one of Silver's 36-inch band saws; one emery grinder; one power driven hub-boring machine; one gauging and boring machine; and one of Wiley & Russel's screw machines, with patent friction countershaft—all of them the best I could get of their kind. I also have a No. 5 Buffalo punch and shear; one upsetting machine and two drills. The three latter machines I have had for a number of years, but hardly think I should have had the other woodworking machinery, etc., if it had not been for "Our Journal," which I always receive with pleasure and would like to get twice as often.

F. Proctor, Tasmania.

More on the Apprentice Question.—I have often thought, when reading the different communications from so many different parts of the world in The American Blacksmith, that I would at some time contribute a few lines on some subject. And while reading over some of the letters I came to one by E. Z. Mark on the apprentice problem, which makes me desire to say that, while, no doubt, much that he says is only too true or has been in some cases, yet we must make exceptions to some of his statements. I believe that very many of our best members of the craft will resent some of the charges he has made. And I trust he will take no offense from my referring in a friendly way to his article. He starts off with a presume and then makes "four accusations," any of which may or may not be true of those who have expressed their regret over the disappearance from our shop and our most honorable trade, of the apprentice.

I am at present in my thirty-seventh year at this trade, that of a "general blacksmith," and served the first three years as an apprentice, at thirty, forty and sixty dollars per year. In those days there was an apprentice in every shop and, usually, when one had been there one and one half years, a second one was taken in and, when three years were up, the apprentice was capable of starting up a shop for himself or of commanding journeyman



REMOVING SECTIONS FROM SICKLE BARS

wages, which were not, of course, so high as now, for the shop-owner could not afford to pay them.

But the fact remains, that it is regrettable one rarely sees an apprentice in a shop now, and I for one am not willing to admit that it is owing to kicks, cuffs and hard knocks, or to the desire of shop-owners to climb to fame or wealth on the shoulders of an apprentice.

I believe the solution of the problem is to be found in the fact that, notwithstanding there are many shop-owners today who are quite willing to treat an apprentice with consideration, help to advance him, and be governed by the divine injunction, "Masters, give unto your servants that which is equal," the majority of our young men of today are looking for a "snap", and this trade, honorable as it is, "is no snap." In conclusion, let me say I do not agree with Mr. Mark when he says a young man cannot complete his trade in one shop, for there are many shops in which everything in general blacksmithing may be learned, and we have one of them.

Good Brothers, Manitoba, Canada.

How to Remove Sections from Sickle Bar.—The cutting section may be removed from the sickle bar in a few minutes the following way and, besides, the old rivets will drop out without the aid of a punch. Place the sickle in the vise, as shown in the engraving, section pointing downward, close the vise until the section will just move tight. The bar is now above and resting on the vise jaw, and by hitting the section on the back with a heavy hammer the rivet will be cut in two by the section. This loosens the rivet in the bar and it will drop out when the bar is removed from the vise. The twenty sections may be removed from the bar in less than a minute in this way without any danger of springing the bar. J. N. Bagley, Kansas.

Those Fifty Lister Lays Again.—In the June number Mr. C. W. Metcalf says he has not run a peanut roaster all his life, and that he finds Nebraska a hot-air State. That may be true in a sense, but the only difference between Nebraska and Iowa is that in Nebraska the Lord furnishes the hot air, while in Iowa the blacksmiths seem to be responsible for the most of it. He also talks about having been up against the best workmen in Nebraska. Not having seen them all, it might have been the poorest one you have, posed as being the finest and fastest workman in the State. I will say that I had that opinion myself at one time, and I thought I was the only real blacksmith on earth. But, finally, I found that the name originated in my own mind, and that I was the only one that had that same opinion of myself. Upon looking around I found there were some others that could give me "cards and spades" at the business. The only consolation I have now is that there are some few that are not any better than I am.

Brother C. W. M. says he would like to know what manner of shape the lister would be in to be heated hot enough to be drawn on two heats. Well, that sounds more like a peanut roaster than a master workman in the art of smithing. Now, is there any reason why a man cannot draw out 18 or 20 inches at one heat and leave it in the same shape as if he had but 6 inches to draw? A trip hammer is not made to hammer things all out of shape, but if you get excited and poke the lay all around under the hammer and let it hit just anywhere, of course it will be out of shape. I have actually seen some who could not sharpen the point of a lister or plow lay with the trip hammer, but drew them by hand to keep them in shape. At one time I supposed that was the only way, but find that it is extra work, and that the purpose of the trip hammer is to sharpen points. Now, although I had never had a man bring me work for a distance of seventy-three miles, there was a man who moved to Salt Lake City, Utah, and still continued to send to me to have his wrenches, chisels and punches made. This was not, however, because there were no good workmen at Salt Lake City, but because I owed him a small account, and I never told it in such a way as to give the impression that my work was better than others. C. W. M. had better come out West for a trip and look over the situation and see some of the up-to-date shops where they do work while you wait—where they have trip hammers, cold disc rolls, cold tire setters, emery stands, lathes, tire furnaces, lawn-mower sharpeners, band saws, planers, drills, boring machines, power tire bolters that will take off the nuts on four wheels while a hand machine does on one. Why, there are shops out here that are 180 feet long by 100 feet wide. Now, think about this a while and come out and get next—out West, where fifty lister lays don't get the trip hammer excited.

G. B. Jewett, Nebraska.

Some Good Advice.—While I do not pretend to be a writer, I should like to say a few words, in hopes that some of the craft will be benefited thereby. I have been in business over forty years, and would say that in that time I have had more experience than money. I have been a hard-working man all these past years, but I have not had the proceeds for the labor I have performed, simply because I have been slow to collect the accounts due me. Now, I can count up thousands of dollars which I need not have lost had I attended to collecting when it should have been done; and the customers I have carried along from year to year do not think any better of me for it. If they have money to exchange for things needed in

my line they will go out of town and pay for what they get, instead of giving it to a man who has credited them for years gone by. It is a foolish practice for a man to be so ambitious to work that he will not take the time to settle with his customers. If you are too chicken hearted to make your customers settle with you in a reasonable length of time you will awaken to the cold fact that you are not a business man, and it is useless to endeavor to comfort yourself thinking you will die any happier for being so good to those fellows who have devoured you.

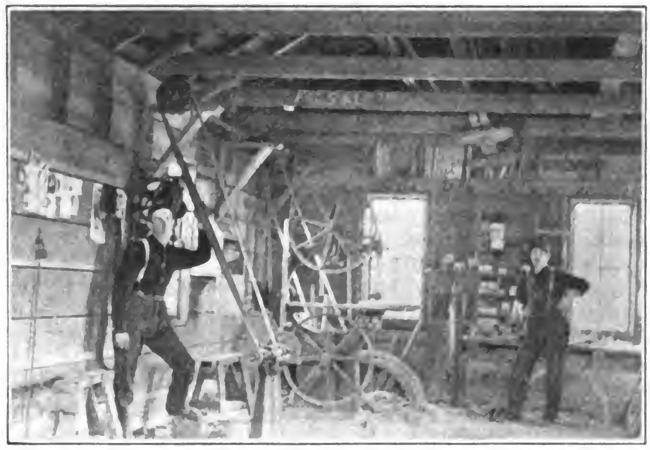
I have a good shop full of machinery, which I run with a six-horsepower, International Engine, which has proved to be good power for me. I have a repository, and sell carriages, harness, blankets, etc., etc. I also own a brick building, eighty feet long, which I transformed into a garage last year, and it proved to be an excellent investment. I have worked on automobiles for several years, and find that it more than makes good the carriage work which is lost by the auto coming into the field. Although I am sixty-two years of age I am not as yet prepared to cease working. Some of my customers have been worrying concerning what they will do for an all-round mechanic when I pass on, but I tell them that some other fellow will more than make my place good. I first learned the machinist trade; then learned carriage wood work and served an apprenticeship at it. Then, I went into business, building vehicles, and found myself obliged to learn to do my own carriage trimming. Soon, I learned to do my own carriage ironing and some of the painting; thus you will see that I have beaten all around the bush, and still I am always learning. Although I have carried on the horseshoeing business for a good many years I have never driven a nail into a horse's foot—this seems strange, does it not?

Here is a bit of excellent advice: Never throw away books with original charges on them, as they are the best evidence you can produce in court; and besides, you may want to refer to them many times. Never forget to date your charges; and, finally, have as near a perfect system in your business as you find it possible to adopt. Also, young man, remember that if you are dishonest with your boss and play it on him, taking advantage of him every way you can, not only will he find it out, but others are watching you as well as your employer, and the truth will find you out some day. Dishonest men do not deserve a good salary and seldom ever get it. I have had men who would grasp every opportunity to get advantage of me, and these men wonder why they do not get good wages.

A. J. Bostwick, Connecticut.

An Oregon Shop Operated by Electricity.—The accompanying engravings show two interior views of my shop. I have been located here for nine years and have a fine trade. During the summer I hire two men. My work is principally shoeing and wagon work and prices are fair. I just put in power last winter and have nearly paid for the machines with the extra work I can do. I do all the band sawing for the lumber yards here. My band saw is a 32-inch Silver's and is operated by a three-horsepower electric motor. This power costs me $3.00 per month. I have been reading "Our Journal" for four or five years now and find it very useful in my business. C. H. Dauchy, Jr., Oregon.

MR. C. H. DAUCHY'S SHOP IS WELL EQUIPPED



ELECTRICITY IS USED FOR POWER IN THIS OREGON SHOP

Water Testing and Well Drilling.—On page 127 of the February number I noticed a request from Mr. G. F. Michels, of Colorado, for the name and address of a company making and selling "water testers." He also states the depths at which he wants the tester to operate and the price he would like to invest.

There are today, as I suppose there always have been, a lot of hoodoo men and nature fakirs whose business is either for glory or gain to hoodwink another class who are as credulous as the former are designing. These two classes constitute the promotors of the divining rod business and their clients, and their appliances are of almost any imaginable description, from a forked peach or hazel twig to apparatus almost as complicated as the Keeley Motor. For these contraptions the most wonderful powers are claimed by those using and selling them. They will find water, locate hidden treasure, locate veins of minerals, tell how deep to drill for petroleum and in some instances are claimed to be able to cause the return of property lost, strayed or stolen. It is a comparatively easy matter to prove the falsity of the claims of the vendors and users of these fake instruments. If, by any means, a man were to come into possession of an instrument such as these various testers are claimed to be he would soon become wealthy. These fakirs are about as poor as any class of individuals one might find. If any one has the time and patience to put them to a test he will find that if the operator be blindfolded and led about over a given piece of ground after a stream of water has been found and its course determined the instrument will make it appear that that stream will meander all over creation, instead of following the course laid while the operator could see. When it comes to the matter of depth to water or mineral, the man and the instrument are as much at sea as they were in the matter of direction.

Time and again I have set up the rig to drill for water, and the parties would have a stake driven into the ground to mark the exact spot where two or three streams of water "crossed" at a certain depth from the surface, and often the stake would be set at about the most inconvenient place on the premises for a well. Sometimes I was able to induce the customer to have the well drilled in a more convenient place; but in the majority of cases I knew that water would not be reached at the depth named by the parties who set the stakes. and I also knew that if I drilled anywhere else and did not get water at the depth named by the water hunter the party having the drilling done would blame me for changing the site of the well in order that I might drill in more feet on the job. So I just drilled at the stake and invariably proved that the water hunter's scheme was simply a fake, or at best, very ordinary guesswork.

Water, not being magnetic in its nature, has no effect on the compass or dipping needle nor on any electric apparatus used to detect its presence. The only reliable machine for testing for water is a machine that will make a hole to the water by which means the supply of water may be tested. Such machines cost much more than one hundred dollars and require skilled operators to use them successfully in making a regular test for water, except under the most favorable conditions. A

good drilling machine is the most reliable outfit for testing for water under all conditions.

If rock no harder than clear limestone is to be penetrated the test may be made with a hand outfit, drilling a three to five inch hole. I learned the rudiments of the art of drilling on such a rig, drilling from four to twenty-five feet per day in slate or limestone. A rig of that kind for drilling small holes might be built for one hundred dollars to one hundred and twenty-five dollars.

In order to designate the most suitable appliance for making a test, one should know the character of material to be penetrated and the general geological structure of the country to be tested.

L. R. SWARTZ, Pennsylvania.

A Discussion on Cold Tire Setters.—I am interested in the subject of shop equipment.

I, for one, believe that every blacksmith should have the very best equipment which it is possible to obtain in order that he may get out the best possible class of work in the shortest possible time and with the least physical effort.

I furthermore believe that unless a smith has these advantages at hand that he is working a hardship upon himself, and neither doing himself nor his customers the justice to which they are entitled. During the past few years a number of very valuable inventions have been added for the betterment of our craft; among them, the trip hammer, the blower and other pieces of machinery which have been a great saving of time and labor and which have in a very short time shown their desirability to members of the craft. There are still a great many needed improvements in our line and, while the process of doing one class of work may be practical, in my mind the method of so doing, or the execution is not always practical, and I wish to take up the matter with readers of your publication and finish out this matter, in order that it may be satisfactorily carried out. I believe you will all agree with me that the blacksmith works as hard or perhaps harder for his money than a man in any other similar line of business. He is certainly entitled to the best that there is to be had, and if there are any new inventions placed on the market that prove practical he should adopt them and, if not practical, they should be most severely criticised. The subject uppermost in my mind at present, and one which I think demands the most careful thought of blacksmiths in every part of the country, is that of the cold process of shrinking tires; by this I mean a process of upsetting the metal without the use of heat.

I know that a great deal has been written about the process in your valued publication and the subject given a great deal of discussion, but I do not believe that it has ever been satisfactorily settled in the minds of all of us. For this reason I wish to ask a few questions to get the opinion of other blacksmiths. I do not believe that anyone doubts the practicability of the cold process insofar as certain metals and certain purposes are concerned, and in view of the many conflicting claims of superiority made by various manufacturers of cold tire setting machines I think that for the benefit of all the members of the craft that it should be brought before them in such a manner, and discussed pro and con, in order that everyone may know what is what and profit thereby.

If the cold process is so good, why does not every blacksmith in the United States—yes, throughout the world—have a cold tire setter in his shop? If the hot process is so good, why is it that some blacksmiths have cold tire setters in their shops and others do not?

A GENERAL SHOP OF OHIO, RUN BY MR. J. W. VAUGHN

If my memory serves me right it has been some ten or twelve years since cold tire setting first came into prominence, and during that time I can mention the names of seven or eight at least who have been manufacturing these machines and who have withdrawn them entirely from the market. I, for one, wish to register a complaint against these manufacturers who have brought out machines which have resulted in damaging the trade of the blacksmith. Members of the craft have spent their good, hard-earned money for these machines and now that the manufacture of these machines has been discontinued they are unable to get parts for them and the machines are practically a dead loss.

I have been a reader of your publication for some time and believe that through your columns justice will be done to every member of the craft on this very important subject. To my knowledge there are now four companies on the market with edge-grip machines, and who are making every effort to interest blacksmiths in their respective machines. Each claims that theirs is the best. The blacksmith is at a loss to know which to choose and is laboring under the theory that if he gets one he may be getting the wrong one. I do not see how anyone can afford to experiment and buy two or three in order to find out that he has made a mistake and did not get the right one.

I believe that we blacksmiths owe it to ourselves to know what we are getting, and for this reason I am writing you in order to get the views of my brother smiths on this very subject.

Why not make these same tire setter companies show us the wherefore and the whyfore of the superiority of these same machines which they are offering? Why not give us the chance to know for ourselves that these facts which they claim are true? It certainly can be no more than just that we ask to know exactly what we are buying before we put our money in it, instead of buying it and finding out that it is not what we want after we have paid for it.

I would suggest that a plan be made and published in your magazine whereby a test could be made, not of one, but of all cold tire setters, so that blacksmiths could attend and satisfy themselves as to the process and as to its desirability.

If the process is right we want to know it; if it is not right we want to know it. The practical features of the trip hammer were brought out to the satisfaction of every smith in the country. The desirability of the gas engine was proven so satisfactorily that there has been no discussion as to its value to the shop. The blower has come to stay, and in spite of all this the discussion of the cold process has been a never-ending one and has been the cause of more discussion and heated argument than perhaps any other one element in our line of business.

I do not go on record as being radical, nor do I at the same time wish to smooth over the faults of myself or of these manufacturers who are making so many conflicting claims of superiority. The tire setting season being now on in full swing I feel that I owe it to myself and to my business to know what would be better for me, if there is anything better to be had.

The cold tire setter manufacturers tell me in their literature that with their machines I can do eight to ten times the work and earn eight to ten times the money with one eighth to one tenth the expense, if I have one of these machines as compared with the hot way. I say "Let them prove it."

As stated above, my suggestion would be to have the blacksmiths and readers of THE AMERICAN BLACKSMITH gather views on it, and if we can all get together we can request these people to place their machines in a competitive test and give us a chance to know for ourselves. If the process is right we can know for ourselves by being on the ground and seeing, and if not we can be satisfied and govern ourselves accordingly.

In a recent issue of your publication I noticed some comment on the cold tire setting proposition, and it has aroused my interest more than ever, now that I am having so much work in that particular line. As to the various mechanical workings of the several cold tire setters on the market and their ability to do the work claimed I will not enter into any discussion. I believe that the smiths all over the country should make a combined effort to decide this question for themselves once and for all and do away with so much needless discussion, if it does not bring anything certain in the end.

What I want to know is, is the process right and, if so, how are we going to know it and how are we going to apply it to our own business?

Through the columns of THE AMERICAN BLACKSMITH I would certainly most kindly appreciate the expressions of my brother smiths, both in their experience as to various machines which they have used in the process and to their opinion as to my method of making these manufacturers come out on an open basis and prove the merits of their machines where all of us can see and be convinced.

I am from Missouri, through and through, when it comes to paying out money for something that I don't get—or it seems that way. I want to be "shown."

FRANK G. HAWKINS, Kansas.

VOLUME 10 | THE FILE COPY | NUMBER 2

THE AMERICAN BLACKSMITH

A Practical Journal of **Blacksmithing and Wagonmaking**

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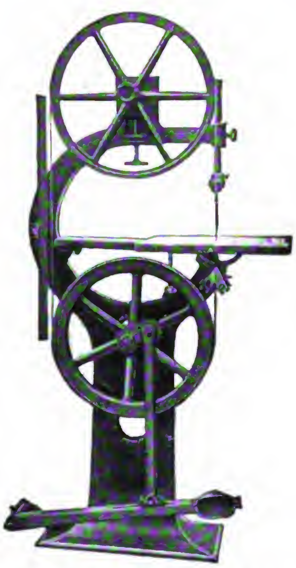

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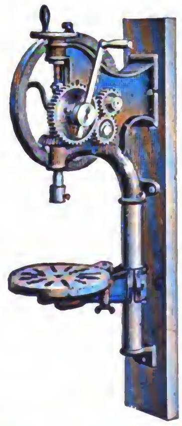

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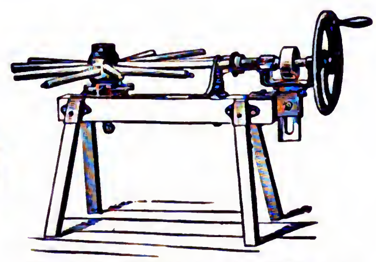

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The American Blacksmith is published monthly at The New Sidway Building, Buffalo, N. Y., U. S. A., by The American Blacksmith Company. Incorporated under New York State Laws. Entered, February 12, 1902, as second-class mail matter at Buffalo, N. Y. Act of Congress, March 3, 1879.

William F. Wendt, - - President.
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Subscription Price: $1.00 per year in advance, prepaid to any postoffice in United States or Mexico. To Canada and other countries, $1.50, or, 6 shillings. Reduced rates to clubs of five or more on application. Domestic long-time rates, strictly in advance: Two years, $1.60; three years, $2.00; four years, $2.50; five years, $3.00. Single copies, 10 cents. Cable address, "Blacksmith," Buffalo.

Subscribers should notify us promptly of non-receipt of paper or change of address. In the latter case it is necessary that you give us both the old and the new address.

A Smith's Wife and Two Mining Companies.

Seems odd, doesn't it, to hear of a woman referring to "Our Journal"? But we just got a letter the other day in which a reader in North Dakota—well, here's the letter, read it for yourself.

"Dear Editor—

I am not going to do without your paper after getting it for so long. It's not only myself who is awaiting it but also the wife. She has it pretty well thumbed before I get a look at it. She doesn't miss much of it, especially the recipe columns. She will say to me: 'There you are now for a boss recipe, note that down.' And in the meantime I sit wishing the kiddie would set up a howl until I get my AMERICAN BLACKSMITH back."

Now, you who have been taking "Our Journal" regularly are not as much surprised at this letter as a smith who does not read it. Just tell your neighbor about this letter. Yes, and while you're about it show him these two. The first comes from the Goldfields Diamond Drilling Company, Limited, of Victoria, Australia. They say "We attach notice for five years' renewal subscription. We have confidence enough in the paper to gamble five years' subscription on it and we enclose money order herewith."

The other letter comes from the Mungan Mining Company, Limited, of Queensland, Australia. "Our smiths appreciate the many tips to be learned from THE AMERICAN BLACKSMITH, and after each journal has gone the rounds it is filed for future reference."

We've shown proof from country smiths and city smiths. We read you letters from smiths in every quarter of the globe. And now we've told you what a smith's wife said and what two big mining companies said—do you need further proof? Tell your neighbor.

Make your neighbor's thanksgiving an occasion for real thanks by getting him to subscribe for THE AMERICAN BLACKSMITH. Tell him what the paper is doing for you and the rest of the craft. Show him this number—point out the articles that you know he will be interested in—tell him how we help "Our Folks," how we protect them from unfair business houses. And then get his subscription.

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Signs and Signs.

How do you advertise your business? Do you depend only upon your shop sign? A shop sign is good as far as it goes, but it "gets" only passersby. Of course, you should have and need a sign, over your shop door. A shop without a sign misses the business that would otherwise walk in.

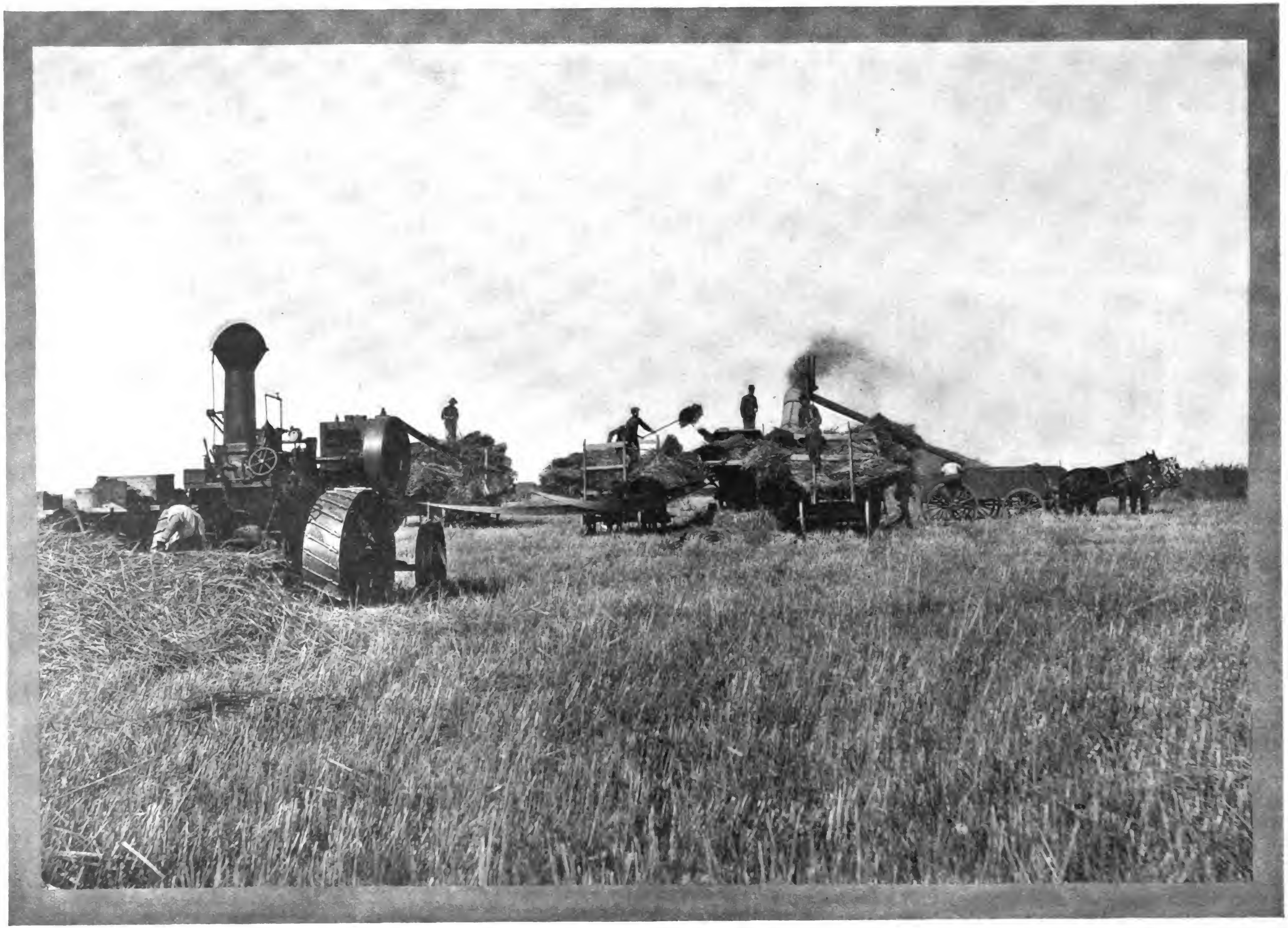
But how about the people that never pass by your shop? How can you "get" them? If they wont come to the sign, take or send the sign to them. That's the solution. Make them see your sign every day. Place your sign where they will see it when the need for your services is felt—when he wants something you want to sell.

And that is just where a calendar with your business card on it fits in. It places your name and business before just the people you want as customers. It keeps your name before them every day for a whole year. And thus it cannot help but get the customer's attention when he needs you.

But then again there are calendars and calendars. Some are suitable and appropriate for the businesses they advertise, others are not. A confectioner, for instance, would not think of using a picture of a bull dog as a calendar subject. He wants something that will appeal daintily to the people;—some picture that will give an idea of the daintiness, sweetness and charm of his confections. A smith shop in like manner should be advertised by something appropriate.

Most persons who have seen our calendar for 1911 say it is the most appropriate picture they have ever seen for smith shop advertising. It is a real worth-having calendar that is worth keeping and worth hanging in the best homes and offices. And fifty of these calendars with your name on them will be distinctly worth calling your very own.

If you haven't sent in your order for some of these calendars, better do so pretty soon. You may not be able to get any at all if you wait. Last year several of "Our Folks" were disappointed because they couldn't get calendars at the last minute. Don't wait—our supply is limited and time will not permit of our ordering a second lot. Send your order today.



THE MODERN DEMAND FOR WHEAT MAKES MODERN IMPLEMENTS A NECESSITY

Designing Ornamental Iron Work

Correct and Incorrect Design — Copying from Nature

THOMAS F. GOOGERTY

ORNAMENTAL wrought-iron work requires as much thought and study in design as any other material, if one is to be successful in producing good work. At the present time the trend of all design leans more to simplicity, depending more for its beauty upon graceful line and curve. The principles involved in design are the same, whether it be designing for wood, iron, textile or any material that is to be enriched by decoration. However, a design that would be suitable for textile would not be appropriate for iron work. A textile design would have to meet the requirements demanded from the loom, while iron would have to be fashioned under different conditions, which would have to be considered when making the design. All good design must be conventionalized, that is to say, a form must be represented according to the position it is to occupy and the material in which it is to be executed.

Designing is not the mere copying of things in nature, as a great many seem to think, but the arrangement of harmonious lines and masses to get a decorative effect. We simply use things in nature as a motif to get our ideas, and arrange them according to fixed rules and principles. It is a question how far realism should be carried in any design; however, wrought-iron designs should not follow nature too closely, but, on the contrary, must be conventionalized. It is not good form to try to represent natural vines and flowers in design of any kind; they should be reduced to a form that is suitable for the material, and representing only the characteristics of the flower and its growth. All curved lines should be pronounced in their direction, and not be made so that they are confusing as to their intention. Curved lines should also be made so that they curve throughout their entire length, and not have short kinks and flat places in them. Repousse work is the art of "bumping" out designs in relief on sheet metal with hammers and punches; in doing this the sheet is heated and hammered on the end grain of wood; this bulges out that part in relief. The piece is then annealed, and when cold it is sometimes hammered on lead, also on special tools fastened in a vise or anvil to sharpen up and give character to the ornament. The ornament raised in this manner when finished should not have the appearance of being stuck on, but should appear as part of the sheet, thereby being truthful.

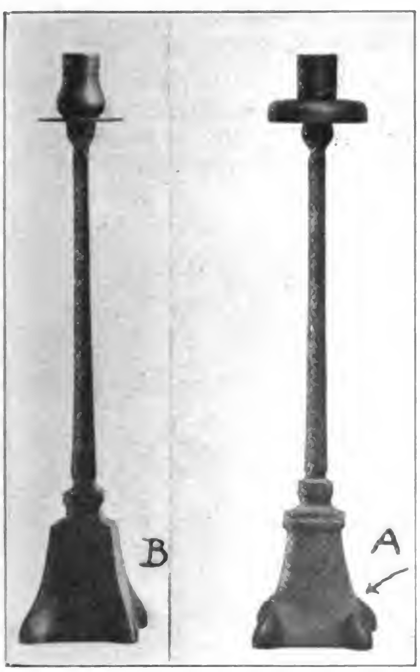


FIG. 1.—TWO CANDLESTICKS ILLUSTRATING CORRECT AND INCORRECT DESIGN


FIG. 2.—THE INTERLACED EFFECT MUST BE CAREFULLY MADE


FIG. 3.—TWO VERY ARTISTIC EFFECTS IN IRON CANDLESTICKS

Figure 1 shows two candlesticks very much alike. The bases of these sticks are hollow and are forged from soft sheet steel, $\frac{1}{8}$-inch thick, formed in a conical shape and welded. They were then hammered somewhat square. The stem was then inserted into the top part and welded and the base afterwards worked into a square shape, as shown.

On the corners of the base the metal is hammered out in order that it may have a firmer footing; also to give it the appearance of strength at the bottom. The stick with the part bulging

FIG. 4.—THE OPPORTUNITIES FOR ORIGINALITY ARE UNLIMITED

out, as shown at A, has the appearance of being stuck on; therefore, it is not good design. It also has an ungraceful curve along the corners. Notice this curve starting from the bottom of the base, moving up along the corner and terminating in a kink, as shown by the arrow, giving the whole base the appearance of having these embossed parts stuck on. The drip pan at the

FIG. 5.—A BUILT-UP LAMP MADE BY RIVETING PIECES TOGETHER

top of this stick is heavy; rather too much so for the base. The pan on the other stick is more in keeping. The parts bulging out on the other stick, at B, have the appearance of growing naturally out of the base; it also has a very graceful curve along the corners, and the sides of the corners curve and gradually terminate into the sides of the base, as they should, giving the whole base the appearance of truthfulness and beauty.

At Figures 2, 3, and 4 are shown hand-forged candlesticks, made from soft steel. The base of these sticks is also hollow, the metal being about $\frac{1}{8}$ of an inch thick. Candlesticks should be made and used in pairs, and they are generally supposed to be set on a mantel. Figures 5 and 6 show portable electric lamps, forged from soft steel. The gauge of metal in the shades is No. 20 and has opalescent glass fastened under them. Fig. 5 has three lights under the shade and its base is built up with pieces by riveting. In Fig. 6 the base and standard are one piece; the standard is welded to a $\frac{3}{16}$-inch plate and formed in shape and a hole drilled through the standard for the wire which connects with the socket. The base and shades of these lamps are square. A base that is made square should always have a square shade. Fig. 7 shows a lamp with the base round and a hexagonal shade. A round shade would also be suitable for this base, but not a square one. The base of this lamp is made from a disk of metal $\frac{1}{8}$-inch thick, domed up in the center, and a $\frac{1}{2}$-inch steam pipe screwed into it, with strips riveted on the side, as shown. Fig. 8 shows a latch suitable for a double door. The interlaced ends of latch are made by drilling holes and then punched while hot. The interlace is made by setting a square end punch on the part that is to be sunken, striking the same with hammer while the metal is hot, and it is afterwards trued with a file.

Hinges may also be made from similar design. There is no end to the variety of interesting forms that may be obtained by using these interlacing elements in working out hinges, etc.

Ornamental Gates and an Ornamental Chandelier.

The engravings shown here are examples of work executed by Mr. A. Greed, of Victoria, Australia. The double gates are for Mr. Greed's own private grounds, while the others were made for the public gardens. The chandelier was made for a church.

The design of the double gate is very pleasing and well executed. These gates were made to match an ornamental fence which Mr. Greed made and placed about his residence. Some of our readers will, no doubt, remember Mr. Greed's article in an earlier number, in which he described his fence, showing photographic views of both the old wooden fence and also the hand-wrought fence which replaced it.

The other gates shown are very pleasing in design and show two radically different treatments, i. e., one

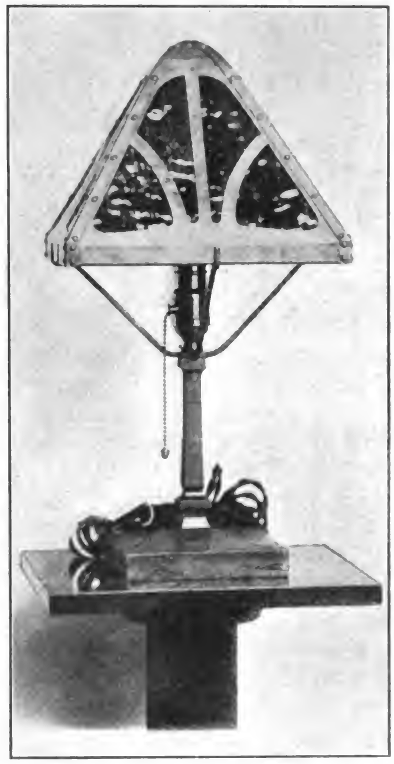


FIG. 6.—LAMP WITH FORGED BASE AND STANDARD

showing straight, square bars and curves, the other a combination of straight and twisted flat work and scrolls. The one more suited for a fence of rather heavy design, the other for a lighter and more ornate fence.

The chandelier is plain, yet carries plenty of ornamentation. For the interior in which this is to be hung it will, no doubt, be very well suited. The

FIG. 7.—STILL ANOTHER VERY ARTISTIC EFFECT

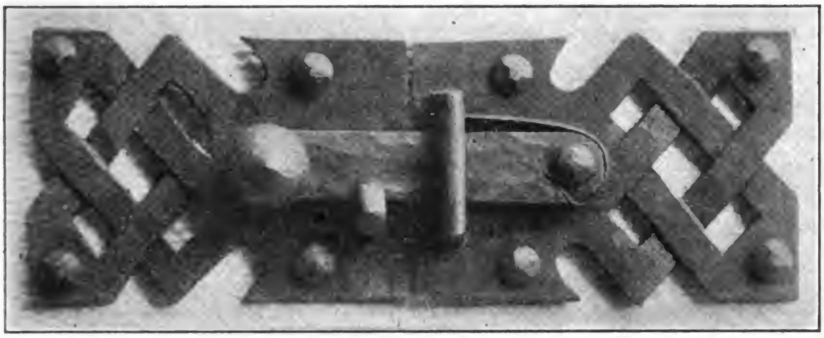


FIG. 8.—THERE IS NO END TO THE VARIETY OF FORMS TO BE OBTAINED BY USING THESE INTERLACED ELEMENTS

design is neat and the piece is well made.

One cannot help but remark about the evenness with which Mr. Greed's scrolls are turned. In none of them can you find a break or inharmonious twist, and

A COMBINATION OF STRAIGHT, SQUARE BARS AND BENDS

they are entirely free from the kinks so apparent in the work of amateurs. That Mr. Greed is an expert with the hammer is very apparent.

Some Ornamental Andirons and Fire Stands.

The engraving on page 32 shows several andirons and two fire stands forged by Mr. James Bettel, of Maine. The work is all very well executed and generally well designed.

No. 1, at the left, is a stand, and is well worked up. The fire-dogs, at No. 2, are very plain, but neat and well made. Those at No. 3 show more ornamentation, but are still not overdone. No. 4 shows another example of plain design, while at No. 5 is shown a very pleasing design in very fancy ornamentation. The twisted hollow globe effects are very well executed, and the whole makes a very artistic set of andirons. The fire stand, at No. 6, is evidently part of the same fire set, as the same general design is followed and with very pleasing result.

Altogether, Mr. Bettel's work is well designed, artistic and very well executed. His designs are nicely proportioned, and the examples show him to be a master of forge and hammer.

Soliciting Business and Collecting Accounts by Mail.

A Series of Straight-to-the-Point Articles Illustrated with Letters That Have "Turned the Trick."

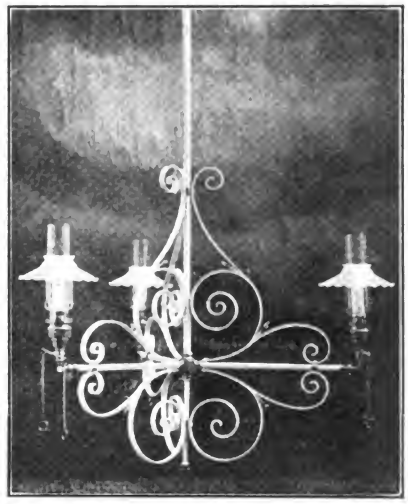
BY THORNTON.

After getting a man's attention it is necessary to hold his interest in order to present your proposition. It's like telling a good story. You never heard anyone who is known as a good story teller allow the interest to lag. When you tell a story you tell just those things that have a bearing on the points of the story. You don't describe every little detail. When you write a letter you write about those things that bear on the main point of the letter. And you write about them from the customer's point of view. You write and speak to the customer about things considered from his viewpoint. To interest him you must write about things or treat them in a way to interest him.

The customer is usually interested in the money end or cost end rather than the finer complications having to do with the manufacture, the materials and the machinery. And in asking for trade in a letter you can't hold the would-be-customer's interest unless you talk to him about the things that interest him.

My reason for emphasizing this interest feature so strongly is because upon it depends the success or failure of the business letter.

For example, let us take an ordinary letter:

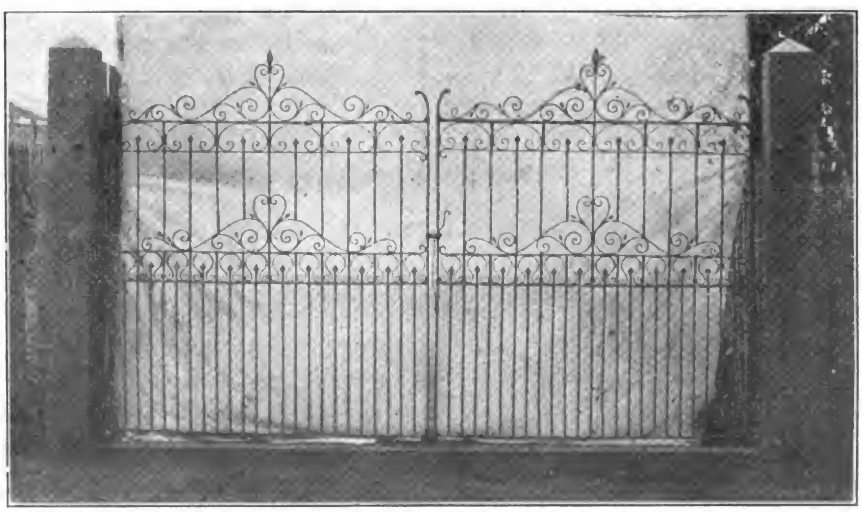


JUST ENOUGH ORNAMENTATION TO MAKE IT ARTISTIC

DEAR SIR:—I have just finished my new shop and would like to have the pleasure of a call from you, etc., etc.

Or another example is:

DEAR SIR:—I am better equipped now than ever before to handle your work. My



THE DOUBLE GATES ARE SOMEWHAT SIMILAR IN DESIGN TO THE SINGLE GATE—THEY WERE MADE TO MATCH A FENCE

10-horsepower Billytaft engine promises to place my shop in the front ranks of the best shops in this county, etc.

It's not necessary to continue. The opening paragraphs of these letters tell

A COMBINATION OF TWISTED FLAT WORK AND SCROLLS

you, without reading any further, just what to expect all the way along to the end. These letters remind me of some men. They ramble along, not seeming to go anywhere in particular nor to get anywhere. In fact, when I get a letter I picture the writer of that letter in my mind. And I think everyone does the same. You see that the prospective customer's mind-picture of you is good.

Here are the same letters re-written in such a way so as to receive attention and hold interest. Note how the proposition is treated from the customer's viewpoint.

DEAR SIR:—You want repairs when you want them. You don't want to wait any longer than the time required to do the work right.

You can't expect a smith shop to turn out your work immediately unless they have facilities for doing so.

Our shop is larger than ever now—larger by 100 square feet—and we can turn out your work when you want it and do it right, too.

And when you consider the way we do things our prices will surprise you. Bring in your plow work now and let us show you how quickly and how well repair work can be done.

The second letter I would change to make it read as follows:

DEAR SIR:—It's annoying to say the least—this waiting for factory parts or for local repairs just when you need your machine or implement. Why do you allow yourself to lose valuable time in profitless waits?

We can turn out your work immediately. Our modern equipment makes it possible. We've just put in a 10-horse Teddyvelt engine that simply makes things hum and hustle. And we've got the machines to go with the engine.

"Your work turned out when you want it," is our business motto. And when it comes to prices—well—they'll surprise you when you see how we do your work.

Here's a letter I sent out when I installed the brazing department:

DEAR SIR:—You wouldn't think of throwing away a wagon wheel simply because it was broken.

Then why throw out cast-iron gear wheels when they break? We can repair them as easily as we repair wagon wheels.

And we not only fix gear wheels as good as new, but other broken castings as well.

If you have a broken casting of any kind, allow us to repair it for you. We can now repair most anything made of cast iron and at less cost than that of a new part.

And as for time—we often repair parts as good as new in half an hour, that would mean days if replaced with new.

Our brazing department will save you both time and money if you give it a chance. There's no question about the quality of the work—you know what Thornton means. Nothing leaves this shop if it isn't right.

Now, before closing, just a word or two about dunning letters. When you ask for money do so in a courteous, tactful manner. Don't threaten the customer. Always bear in mind that there is a chance for more business where you once did business. And a slow payer's money is just as good as the cash customer's. But, then, don't allow the slow payer to impose upon you. There is a good deal in teaching customers to understand that they must pay up promptly. The only way to get the prompt payment idea firmly fixed in their minds is to tactfully insist upon payment when an account is due. A letter along these lines is as follows:

DEAR SIR:—When you opened your charge account you said you would pay the first of each month. Of course, I have accordingly allowed you anywhere between the 1st and the 10th to settle your account.

But here it is the 15th and I haven't yet heard from you. Is there anything wrong—is there any error in my statement of your account? I would like very much to hear from you.

Are you interested in machinery? If you are I think you'll want to see the new machines I recently put in. Why not stop in a few minutes when you come past? I'll be glad to explain anything that interests you.

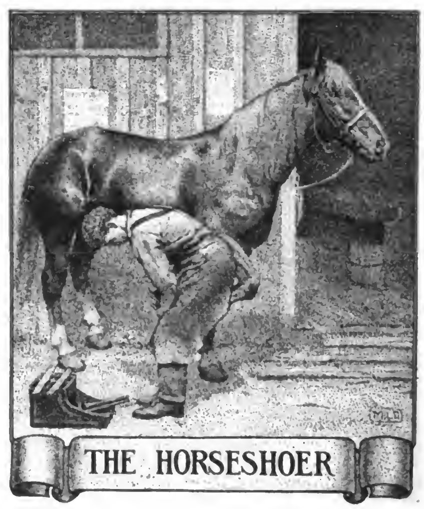
If your man doesn't write or explain in person, write him again along this line:

DEAR SIR:—You know from my letter of several days ago that your account is considerably past the usual limit. I feel that our very pleasant business relations deserve an answer explaining why I have not heard from you.

If there is anything wrong with our work for you or with my statement wont you kindly tell me about it?

I shall await your reply with interest.

After the second letter make your requests for settlement very brief. But don't forget to be courteous.



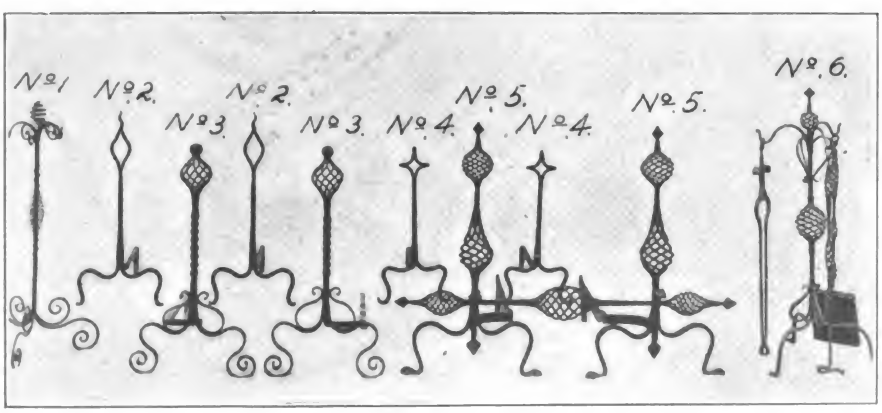
Unintentional Abuse of Horses.

PROF. JESSE BEERY.

A great deal has been said and written concerning humane treatment of dumb animals, especially the horse. Societies have been formed for prevention of cruelty to dumb animals, and other organized campaigns conducted for the same purpose.

These efforts have accomplished much to prevent beatings and starvation and the use of decrepit and lame animals. There are yet localities where much can be accomplished along this line. There are other abuses of horses besides beatings and starvation that need attention.

Conditions have so changed in the last quarter century that the type of horse has materially changed. The



MR. BETTEL'S ANDIRONS ARE WELL DESIGNED AND NEATLY EXECUTED

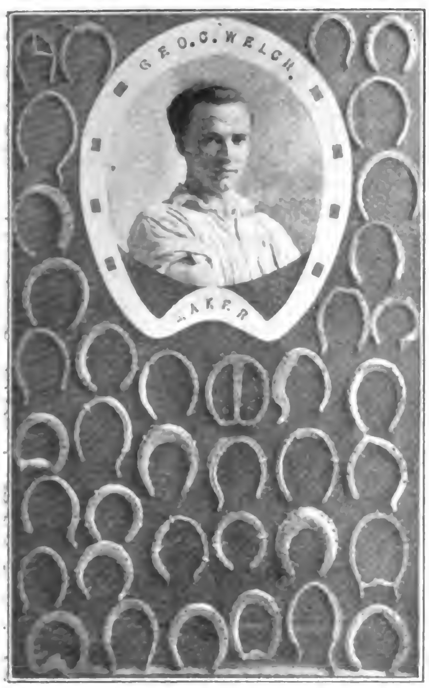
fast transformation of the "mud" roads into solid, smooth macadam pikes has caused the slow, steady, driving horse to be replaced by the high stepping, high spirited, fast road horse, that is the pride of the young man and his father, alike.

The farm horse of a quarter century ago was light in weight and low bred as compared with the present day farm horse. This light, low bred farm horse had stumps, stones and tough sod to pull against in the field, and the tough mud when hauling loads to market. He necessarily was slow and sluggish, he couldn't be otherwise.

Several improvements in farms, by removal of stones and stumps and use of tile ditches, together with the increased weight of farm horses, has demanded a more active, high spirited horse.

The large draft horse of today must show plenty of knee and hock action, a fast walk and plenty of life, if he catches the eye of the farmer. Men have learned by experience that they cannot beat this high bred horse as they did his ancestors. His high spirit resents it.

Cool business calculation teaches that there is no money in starving a horse.



A CASE OF WELL-MADE SHOES BY A MISSOURI SMITH

Together with the arousing of public sentiment the evolution of the horse has caused a great decrease in the old time cruelty. But this does not necessarily mean that cruelty has ceased, but what I do wish to show is that the nature of the cruelty has changed as the disposition of the horse has changed.

A WELL-APPEARING GENERAL SHOP OF NEW YORK STATE

It is a very common thing to see a man driving a horse along the road at its highest speed, kept up by a continuous twitching of the rein or tapping of the whip or both. When he stops he stops the horse suddenly and starts with a full burst of speed.

It is not so much fast driving that I wish to condemn as the manner in which it is done. When you see a horse driven as just mentioned you will notice that it lasts about two years and is then considered as "knocked out" for the roads. A new horse is bought, and he too goes through the same grind.

It has not been the number of miles such a horse has gone, nor the number of beatings nor starvation, but the continual "nagging" that limited his usefulness to two years.

What I mean by nagging is any process that keeps a horse continually nervous. Some people delight to keep a horse, "on his nerve" or "showing his mettle," little thinking they are practicing as dire cruelty as the man who used a club on his low bred horse.

I am not sure but that we will all agree, when we understand all the conditions, that he who used the club was the most humane. The club was used most on a thick hide, a low nervous organization and sluggish disposition. The nagging process is used on a horse that has highy developed nerves, thin, sensitive skin and hot blood.

The club bruised a small area of flesh and irritated a few nerves that scarcely aroused the sluggish brain. Nagging throws the whole nervous system out of the normal, arouses a sensitive brain and starts the blood flowing at fever heat. Such a horse truly is on his nerve. He uses his nervous energy at a rapid rate and hence' his quick decline. He ages rapidly. Rheumatism, stiffened muscles and indigestion result from such a strain upon the nervous system.

When a horse is kept up to his highest pitch, with his nerves on a continual strain, it is nothing less than torture, and torture of the worst kind. The more spirited the horse, the greater becomes the torture.

A small spot constantly irritated on a nervous horse is often the source of more annoyance than a large, running sore would be to a horse of less sensibility.

Just today my attention was called to a highly bred young coach horse that is developing an ugly temper, which I found to be caused by a sore back. The young owner had adopted the fad of driving without breeching, leaving the buggy to be stopped by the back-band. This inevitably causes irritation, and at a spot that is very sensitive.

Custom sometimes allows this form of torture to pass unnoticed, while using a horse with a wound that would be odious to the sight but far less severe to the horse would be sufficient cause for a heavy fine.

Many people allow their horses to become obstinate and balk or have some sort of mad tantrum. This is just about as excusable in a horse as it is in a child.

I have seen parents allow their children to kick, bite and scream in a paroxysm of madness, until the child quit from pure exhaustion. No attempt would be made to stop the child, and it would be excused on the plea of an "ungovernable temper," or "extremely nervous." The fault would not be the child's but the parents'.

If the parents had used good sense in government, one word would have stopped the whole affair and saved the child from the suffering it endured.

The same thing is true of the horse, and there is no more reason for it to

suffer with mad tantrums than the child.

When a man has his horse under his control, as he should, he can prevent all that wear and tear on his nerves and save the horse the suffering it endures.

Talk about a horse missing a few feeds or a few drinks of water, but that sort of suffering doesn't compare to being "nagged" from morning till night by a clumsy, careless driver, or irritated by harness or being in a mad fit for a half day at a time.

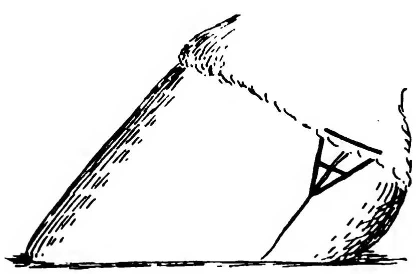
The higher the breeding, the more high spirited, alert, proud horse we develop, the greater becomes the necessity for us to recognize that the form of cruelty may be shifted from the outward and physical to the nerves of a horse.

Treating Cracked Hoof.

J. KENDALL.

The general idea in treating cracked hoof seems to be to plate the hoof, or in some way to stop the movement in the old horn and put on all kinds of fancy shoes, hoof ointment, etc., instead of stopping the movement at the top of the crack, where the new horn is being formed—at the coronary band.

I find it is much easier to treat part of the hoof than the whole, so I cut a groove down through the horn on each side of the crack and about $\frac{5}{8}$ to $\frac{3}{4}$ of an inch from it at the top and coming to a point about $1\frac{1}{2}$ inches down the hoof,



TREATING A CRACKED HOOF

thus forming a V with the crack down the middle. I then clamp the V-shaped piece about midway up, also draw hot iron deeply across top of V, just above the horn. Any flat, ordinary or bar shoe will do, if the bottom of the hoof is properly leveled. A clamp or two may be put in below the V. If the horn is being kept at work, no amount of trouble will make the old horn grow together again. The object is to keep the part where the new horn is being formed from moving, and by practically isolating it from the rest of the hoof you give nature a chance to do the work under the most favorable circumstances. Attempting to make the old horn grow together is time wasted. The thing to do is to assist nature in growing a new, perfect horn.

Treating Seedy Toe.

A. T. WRIGHT.

I wish to give a remedy for a foot upon which the wall has parted from the sole at the toe. I have cured several cases that were so bad that I could put my three fingers to the second joint between the sole and the wall. I made a frying pan out of a circular saw, 10 inches across the bottom and 2 inches in depth. Put into this pan an equal proportion of beeswax and tallow. Rasp and trim the foot as you would for a shoe. Have the mixture heating and, after taking from the fire, pour in about three tablespoonfuls of turpentine. Have your pan hot enough to fry the foot. Now set the foot in hot mixture and let it fry about two or three minutes. Take your knife and cut away all the cooked part and fit your shoe. Nail it on, but not too tight. Heat the mixture again and set the foot in. Take a little paddle and rub off the hoof. Repeat this every two weeks.

How They Shoe Vicious Ones in South Africa.

CHAS. S. SPRADBROW.

I noticed at the beginning of the year a letter instructing, or shall I say "preaching," of the ability of one L. E. Phifer, on his qualifications of shoeing and handling horses, and have since read many letters replying, and some are very good. All I can say is that Mr. Phifer is a real marvel. I like our friend Casey's reply. It is very much to the point, and I only wish that I had the services of a man like Phifer to help me with some of the mules I have visiting me. I don't use the stocks; in fact, I never have done so, but I must say that a side line is very useful and saves many a bad kick. I can quite picture Friend Casey and the bronco he writes about.

During the late war, when I was working with my father in Durban, we had a lot of remounts to shoe (quite a number of which came from your part of the world—out West). The accompanying pictures will show how we had to combat with the brutes, preparing and fitting the shoe. If my old friend Jack Kennedy sees the picture of the boy with the shiny forehead he will, no doubt, recognize him. (While speaking of Mr. Kennedy, I should like to know if any of our readers could give me his address.) Another picture shows the shop-boy taking his snuff, and a friend of his—a dwarf who was acting in the capacity of court messenger and who can throw his assegai with great alacrity.

Horseshoeing in Other Countries.

The Character of the Work and the General Conditions and the Tools and Supplies Used.—A Series of Reports by American Consular Officers.

MEXICO.

ACAPULCO.

The tools used in the simple shops of this section consist of anvils, vises,

THEY SOMETIMES HAVE DIFFICULTY IN SHOEING AN ANIMAL

hardies, tongs, hammers, hot chisels and forge and bellows. The nails commonly used are of Swedish manufacture. Iron in bars is shipped to this point from Mazatlan, and the shoes are made in a near-by village, Savana. Native charcoal is used.

CHIHUAHUA.

The method of horseshoeing first adopted in Chihuahua was in imitation of the Spanish method, and Spanish and French tools were used in the work. The later influx of American capital and of American contractors and overseers determined the present type of shoeing, which is distinctively American. There are still a few old-fashioned French and Spanish tools in use, but they are being displaced by American hammers, horseshoe rasps, knives and forging tools. English anvils outnumber all other makes. The better grade of horseshoes is imported from the United States, while rough shoes are made by the local blacksmiths. Considerable business is done in the way of buying up old horseshoes and cutting them down to make mule shoes. One large-sized old horseshoe makes two mule shoes. The horseshoe nails sold and used locally come from the United States and Sweden. The Swedish nails outsell the American because of their lower cost, although the American nail is acknowledged to be a superior article in both design and quality. American nails are steadily gaining in favor in spite of their greater cost. Some of the iron and coal used is

imported from the United States, but most of it comes from the State of Chihuahua.

CIUDAD JUAREZ.

The shops are simple and inexpensive affairs, and the interior is strewed with old material, the fragments of old vehicles, and old implements of iron and steel that may be worked over into horseshoes or used for repair work. In one end is the anvil, the hand bellows, the hammer and tongs and such other tools as were used in New England sixty years ago. The horseshoes are generally made by the blacksmith from old scrap iron and an occasional bar of new. There are American-made shoes on the market, manufactured in Poughkeepsie, N. Y., but they come very high, the duty on them being 22 cents Mexican per 2.2 pounds. The only nail I can find on the market in this city is made in Sweden. hardware houses. The coal comes from mines in Coahuila.

ENSENADA.

The business of horseshoeing and blacksmithing in this city is practically controlled by one man. The tools used are entirely of American manufacture. Besides the ordinary tools of the trade in his shop were noted a Champion blower, a tire setter and a drill for metals; also a six-horsepower Union gasoline engine, one ripsaw, one bandsaw and an emery wheel. All shoeing supplies, including shoes, nails, iron, coal, etc., are obtained from the United States. The methods employed here in shoeing are in all respects similar to those in the United States.

FRONTERA.

Tabasco being an alluvial plain, remarkably free of stones and rocks, the foot of the horse or mule is never shod for service on the plain, especially as the low, wet lands of this State inevitably create rot when horses are shod. The horses and mules which carry the traffic between the plain and mountain range forming the boundary line between Tabasco and Chiapas are shod at either Tapijulapa or Pichucalco, over the line of Chiapas, by native artisans who can hardly be classified as blacksmiths and who make their own shoes and nails, which are of the most primitive kind and shape. Their tools consist of an ordinary chisel, rasp, hammer and tongs, and are best described as the kind in use in Western New York about 50 or 60 years ago. The insignificant amount of iron employed for shoeing the small number of horses that annually pass over the mountain ranges of Chiapas is obtained from San Juan Bautista, the capital of this State, and is imported principally from England and Germany. A small quantity is imported from the United States.

GUADALAJARA.

The tools used here in shoeing are the same as those used in the United States, with the exception of one called a "pujabante," a steel cutter with a blade about 2½ inches wide, sharpened only at the end, with the sides slightly turned up. The handle consists of a projecting steel "L" to facilitate the grip, and a long wooden extension to enable the blacksmith to push the tool with his chest, just as a carpenter uses a brace. This pujabante is used to pare and trim the hoof, and is preferred by local smiths to the knife.

All supplies, nails, iron, coal and some of the shoes are imported from the United States. The shoes come in sizes, but not shaped. Bellows are made here. Coal is imported from the United States. There is an establishment in the Republic manufacturing shoes, and I am informed that the Mexican-made shoe is quite extensively used in the Central and Southern States. The soft coal of New Mexico is in general use for blacksmithing.

IN SOUTH AFRICA THEY TIE THE VICIOUS ANIMAL SECURELY BEFORE BEGINNING SHOEING OPERATIONS

THE DWARF IS A COURT MESSENGER. HE THROWS THE ASSEGAI (A KIND OF SPEAR) WITH EXPERTNESS

CIUDAD PORFIRIO DIAZ.

The tools used here are few and only the most necessary, and they are of a very inferior quality, although of American manufacture. The horseshoes and nails, shoeing supplies, etc., come from New York, Illinois and Texas, and the coal from Mexico.

DURANGO.

The tools are of local, German or American make, and consist of such as are usually seen in a one-fire shop in the United States, including an anvil, forge, hand-power drill, hammers and other small tools. Horseshoes are all made in the shop from bar iron. Nails and iron are purchased locally from

The repair of conveyances and general tinkering is a separate business, though frequently located in connection with or near to a blacksmith shop. The tools used are similar to those in the United States.

HERMOSILEO.

The tools used here are both home and American made. Shoes and nails come altogether from the United States, and iron from the United States and England. Coke made here is used as fuel.

LA PAZ.

There are no blacksmith shops for horseshoeing in this city. There are eight or ten public carriages and three or four private ones that are driven to horses. Aside from this, mules are used for all the hauling in the town. For transporting freight into the interior, pack mules and ox teams are used. Mules are also generally used for saddle riding. None of the streets of La Paz are paved, and this may account for

the fact that almost without exception the horses and mules go unshod.

MANZANILLO.

Horseshoeing is generally done by the foreman of pack trains, and the tools used are a knife to trim the hoofs, rasp, hammer, file and pincers. In the City of Colima there are many small blacksmith shops with hand forges that are made by the smiths themselves. They have an anvil and a very limited amount of the most common tools. The nails are imported from Germany and the United States. The latter are preferred, as the iron is more ductile. The shoes have heretofore been imported from the United States, but now there is a factory in the State of Guanajuato that furnishes nearly all of the shoes used in this district. Wood charcoal is used by all the blacksmiths.

MATAMOROS.

Ordinary tools, such as will be found in small towns in the United States, are used here. The blacksmiths make the shoes, buying the iron and nails from local dealers who import from the United States.

MAZATLAN.

Horseshoeing as practiced in Mazatlan does not come up to the standard set by the average blacksmith in the United States. The tools used are the same as those found in the average village blacksmith shops—tongs, hammers, files, knives, etc. The shoes are generally bought ready made, the source of supply being the United States. The nails come from Sweden for the most part, the American product not being able to compete. The small amount of iron used is purchased from a local foundry. Coal is also purchased at the foundry, and is the ordinary anthracite variety.

MEXICO CITY.

Horseshoeing is carried on in very much the same manner as in the United States, with, in many places, American experts. Iron and coal and some of the shoes are supplied in Mexico, while the nails and many of the shoes, especially those of the better class and those with rubber attachments, are imported from the United States.

MONTEREY.

Blacksmith tools, similar to those used in the Uuited States, are employed, the blacksmith making nearly all of them by hand. Both native and American coal is bought from local dealers. Bar iron and nails are procured from local hardware stores, the larger part of such supplies coming from the United States. Iron shoes are made by hand by each blacksmith, and rubber shoes are sold by local hardware dealers. The few tools that are not made by hand are purchased at local hardware stores and, as a rule, are of American manufacture.

NOGALES.

As this consular district is immediately adjacent to the United States, practically the same conditions prevail as in the United States. All tools are hand tools and the same kind and manufacture as those used in the village blacksmith shops of the United States. About one third the shops have cold-tire setting machines, also of American manufacture. All shoeing supplies, including nails, shoes, iron, coal, etc., are imported from the United States. On the large ranches, shoes known variously as the Cowboy, Bronco, Perkins, etc., are used. These come from jobbing houses in the United States, already punched and turned, and are put on by the cowboys themselves.

MR. WILLIAM ELLIS

He is 80 years old, and probably one of the oldest blacksmiths in Iowa. He takes an active part in running a general blacksmith shop, and on his 80th birthday, August 1st, he shod 12 horses and made two coal picks. His coal pick, used by mining men, is a very difficult thing to make, but Mr. Ellis' workmanship is such that he has orders for them from all over the State.

NUEVO LAREDO.

The shops are quite similar to those in the United States, with the exception that the variety of tools is more limited. None of the shops are supplied with mandrils and tire setters. All supplies, including shoes, nails, iron, coal, etc., are obtained from the United States.

PROGRESO.

The tools are the ordinary tools found in general use in blacksmith establishments in the United States. Shoeing supplies, shoes, nails, iron, coal, etc., are obtained from England and the United States.

SALINA CRUZ.

Horseshoeing does not obtain as a practice with the native population of the Isthmus of Tehuantepec. It is safe to say that 95 per cent of the horses and other draft animals are today unshod. This statement is subject to this modification, that the horses and mules used by foreigners are for the most part shod, as well as the horses used by the "rurales" (rural guards) on certain parts of the isthmus. American tools are used to some extent, also adaptations of American tools, and in instances improvised instruments. A very limited supply of shoes and nails is obtained from the United States, Germany and Belgium, soft iron being obtained from the last country for a small amount of cold shoeing. The amount of iron for shoes and nails used on the isthmus for horseshoeing is a negligible quantity.

SAN LUIS POTOSI.

The interior of the shops is extremely simple, furnished only with a forge, anvil and the most indispensable tools. A large part of the work is not done in the shop at all, the horseshoer going from place to place, where his services are needed, and taking his tools with him. The kind of tools used are such as those most commonly seen in the village blacksmith's shop in the United States. The anvils are of English manufacture. The forge is from the United States. Hammers, sledges, rasps, files, tongs, etc., are mostly of American manufacture. The largest dealer in these tools states that owing to the superior quality they have displaced within the last five years those of European manufacture. In the poorer workshops, however, some of the tools, such as cold chisels, punches, tongs and hoof trimmers have been made by the workmen themselves and are roughly fashioned. The American tools are greatly liked and are found in the kits of the best workmen. Shoeing supplies are obtained almost entirely within the country. The shoes are usually made at the shop where applied, refuse bolts and other scrap material being commonly beaten roughly into shape. Any kind of scrap wrought iron

is made to serve, and such shoes are said to wear from one month to six weeks. Shoes are also found for sale in the hardware stores. These are of better grade, but are also of domestic workmanship, supplied by the blacksmiths of the city to the stores.

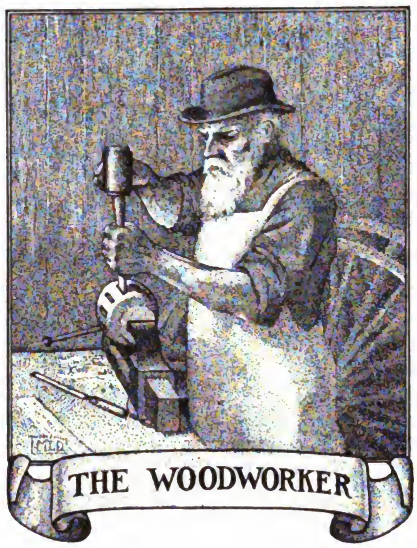
Three styles of horseshoe nails are in use here, known as the Capewell, the Globe, and the Crown. The Capewell is the favorite and the most generally used, even though slightly higher priced than the other two. The others are reported to be Norwegian and English, respectively, though the merchants stated that they could not be positive, as the orders had been placed through commission houses. The iron used, both for shoes and repair work, as explained, is usually made of waste and scrap iron. One dealer stated that some of the iron purchased by the shops was made in Monterey. There is probably very little imported for the purpose. German tools of the cheaper grades are in competition with the American product, but the latter are preferred. The fuel used is native charcoal.

TAMPICO.

Horseshoeing is not an important industry in this district. There are few horses and mules and little demand for shoeing. In the city the greatest demand for work of this kind comes from the street car company, which operates its cars with mules, and which has its own shop and employees for this work. In the country districts the mules are shod only on the fore feet. The demand in Mexico is almost entirely for mule shoes. Practically all of the shoes used in the country are imported from the United States. Horseshoe nails are imported from the United States and Sweden. Anvils come almost entirely from England. Formerly, hammers were imported from France, but now they are bought in the United States. The blacksmiths make almost all of the smaller tools used by them in their work.

VERACRUZ.

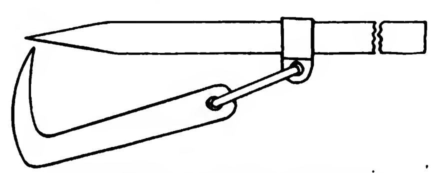
Horseshoeing is a trade that has few followers in the State of Veracruz and, comparatively speaking, fewer in this city. Horses are not used generally as draft animals. There are not over 150 horses in this city, and the mules are used exclusively in carts, drays, wagons and trucks. There are about 700 mules so employed and 90 per cent of them go unshod. A farrier or horseshoer does nothing else in the blacksmithing line. There are but three or four here who have what may be termed a shop. There are a number of men who have no regular place of business, and will go wherever called to shoe animals. The tools in use are like those employed in the United States for years. Shoes for horses and mules in use here are all homemade, and no skill is displayed in their production. Parts of old shoes are welded together and new ones made of them. When new iron is used it is either native, German, Belgian or American, and so also with nails, though there seems to be a preference in favor of the nails from Sweden. After all, the cheapest finds the readiest sale. The coal is the soft variety, coming principally from the United States.



Dished Wheels and Plumb Spokes.

W. H. GUNN.

In our September number, page 296, Brother Vestal wants to know a few things, incidentally replying to an article of mine on setting axles.



AN EASILY-MADE BOLT HOLDER

I shall take pleasure in submitting what little I know, with due deference to my critics.

We dish wheels as a brace bearing, to offset the strain of a deep hole; while the diameter of the tire, being less, bends the rim harder, until it passes the center of gravity, or goes backwards.

A spoke should be plumb, because a post will stand more strain or weight in a vertical position than when set at an angle.

The taper of an axle has nothing to do with the wheel, as we work from a common center of the box, which is supposed to be centered in the hub and on a parallel line with the square of the rim, at right angles. Neither is the "swing" to be considered in this case. In making wheels and setting axles, conditions must yield to principle, as in everything else.

I don't claim that all axles should be set by curving the center. As a matter of fact, the arm must be set according to the dish of the wheel. But I do hold that no axle is properly set unless both wheels are on a straight line bottom bearing.

It makes no difference about the width of the spoke, if we go by centers, because the principle of an angle can only be determined by center lines, which I tried to explain in the June number.

Friend Vestal says, "If it takes a man twenty years to learn the blacksmith trade, he had better never start." I do not agree with him. The "Perfect Man," who knows it all, has not yet been born.

Young says: "Reason is progressive: Instinct complete. Were our days coeval with the sun, we would die with our lesson half learned."

If we would all reason out the problems of mechanism from the viewpoint of common sense the burdens of time would be lighter.

An Easily-Made Bolt Holder.

JOS. P. COLLINS.

The bolt holder shown in the engraving is very handy and is very easily made. To make it, take a piece of $\frac{5}{8}$-inch steel about two feet long and forge out one end something like a cold chisel. After forging the end, temper it the same as tempering a cold chisel. Now take a piece of bar iron $\frac{1}{4}$ by $1\frac{1}{4}$ inches and bend this around the $\frac{5}{8}$-inch stock to form a band, but do not weld; instead, punch holes in the ends. Now take a piece of old buggy tire and make a hook about five inches long. Punch a hole in this piece to receive a $\frac{5}{16}$-inch rod. To connect the hook and the band, make a link from $\frac{5}{16}$-inch stock, run it through the holes in the band and the hook and then weld. The link is then shaped up, the band slipped on the $\frac{5}{8}$-inch bar and your holder is ready for use.

Labor-Saving Derrick for Handling Heavy Work.

FRED SCHULZE.

This device is easily built, saves lots of heavy labor and costs very little. The material needed is as follows: Four pieces of straight-grained lumber, 4 by

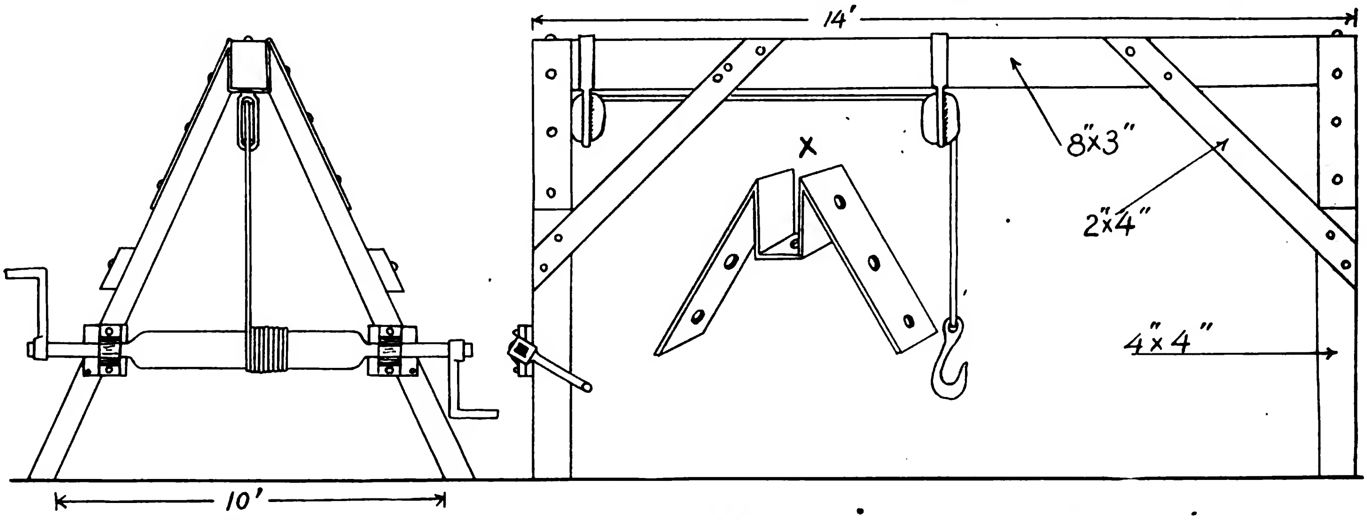
4 inches and 16 feet long; one piece 3 by 8 inches and 14 feet long. For the roller or winding drum use a piece of pipe not less than 3 inches in diameter. The legs of the derrick are held in place or fastened to the horizontal arm or beam by two forgings, as shown at X. These forgings, as shown, are bolted to the top side of the legs and pass over the upper end of the legs and under the horizontal beam. Four braces are also used to strengthen the derrick.

The construction of the derrick is very simple and, as all dimensions are given, no difficulty should be experienced in making it.

The roller or drum, as stated, is a piece of pipe. The ends of this pipe should be squared after inserting a short piece in each end to make the ends solid. Then fit cranks to each end. The cranks may be made of 1-inch round stock. The ends of the crank which are to fit over the squared ends of the pipe should of course be flattened and squared, so as to make a good, snug fit.

Two pulley blocks, as shown, are used in connection with steel cable and a hook. Or, if desired, a regulation hoisting tackle could be used. The latter is operated by means of an endless chain. This would, of course, do away with the roller, cranks and pulley blocks, as shown in the engraving.

To hold the load, when hoisted, one of the cranks can be taken off and reversed, thus causing the handle to strike against the leg of the derrick and holding the load securely.



THIS DEVICE IS EASILY BUILT, SAVES LABOR, AND MAY BE CONSTRUCTED AT VERY SMALL COST

The Exterior of the Shop.

F. G. LEWIS.

"Our Journal" has been doing good work along the line of slicking up the interior of the shop, but, aside from suggesting a coat of paint, the outside of the shop has been neglected. Why this has been I cannot understand. Seems to me the outside is just as important as the inside—if not more important. For if the outside is not inviting how can you expect a customer to come inside?

Now, I intend to dig right into the heart of things in talking of this matter; so, look out, you smiths, who have not been keeping your shops right "up to snuff."

First, I want to ask "Our Journal" readers if they have ever noticed the differences between the interiors and exteriors of some shops? For instance, some shop interiors will show a very up-to-date equipment—power hammer, gas engine, emery wheel and good power outfit, while the exterior will present the appearance of some old junk yard. There'll be an old buggy or two, with iron work all rust; a collection of old wheels; a few broken plow handles; perhaps the remains of an old reaper or two, and goodness only knows what is not contained in the collection. And this old junk is usually scattered about the front of the shop, both sides and sometimes around the back, depending upon the age of the shop. Should one inventory this stock of junk one would perhaps find that less than one tenth of it was at all usable. The other nine tenths or more one would find either absolutely worthless or, at most, good for firewood, or as junk at one or two cents a pound.

Now, brothers, you know the conditions I speak of. You know the exteriors of your shops well enough to know whether I am "hitting" you or not. If this little talk strikes you, then I hope that you will at least try my suggestions for doing away with the outside junk yard.

And my suggestions are simply to do away with the junk yard by doing away with it. Clean it up, sweep it out, cart it away. I don't much care what you do with it, but do something to get rid of that old stuff.

To those of you who think your junk yard contains something of value, take some day when work is slack and pick out that stuff that you think of value. If you find an old gear, take it apart, saving out all the irons, bolts and things that appear good. Take the old reapers apart, save and sort the good pieces. If any of those old wheels are good, take them inside the shop, where the rain and snow can't get at them. And when you've saved everything of value see that the other is sold to the junk man at the first opportunity.

You see, there's no economy in letting things stand out in the weather. If the stuff in your junk yard is scrap, its value as such is lessened by wind and weather. If it is good for use in repair work, its usefulness, value and strength grow less each day you allow it to remain out there with the sky for a roof.

Let us all work together to abolish the smith shop junk yard. If its contents are worth saving, get them into savable shape. If it is worth nothing except as scrap, see that the junk man gets it and see that he gets it soon.

Some Trouble-Saving Automobile Hints.

The following, says an exchange, is the composition of an effective carbon remover: Equal parts of alcohol, carbon disulphide and light cylinder oil. It acts more rapidly without cylinder oil or with a less proportion but judgment must be used to insure that the cylinder walls are not left without lubrica-

tion and cut before more oil reaches them.

The platinum points of the tremblers of the coil should not be allowed to become pitted and uneven through neglect. They should be examined occasionally and, if uneven, should be trimmed flat with a fine file.

Use plenty of graphite with the packing when repacking a water circulating pump. A teaspoonful of flake graphite to a pint of lubricating oil results in better lubrication of the cylinders, better compression and saves oil.

Examine the fuel tank frequently to see whether or not it has sprung a leak, and the seams and the union connecting the pipe to the tanks should be carefully inspected.

The Editor was busily looking over a pile of manuscript when Joe Deamers came in.

"Hello! Mr. Editor!" exclaimed Joe. "How are those cigars of yours?" Deamers is quite fond of the Editor's cigars and he never hesitates to let the Editor know it. And the Editor, on the other hand, is generally liberal.

"Help yourself, Joe. Think you'll find the box about half full."

After lighting his cigar and settling himself comfortably in Benton's favorite chair, Deamers said, "I was just passing and thought I'd drop in and see if you still kept those good cigars handy. I see you do, all right, so I guess I'll chat for a minute."

"I'm glad you stopped in, Joe, but if you think you can come in here, smoke my cigars and take up my time without giving something in return, you are quite mistaken." Then the Editor questioned, "How is business down your way and how are you getting on?"

"Well, now I'm glad you spoke of that, Mr. Editor," said Joe, taking his feet from the neighboring chair and leaning forward in an interested way. "Perhaps you can help me. I don't mind telling you that matters are not as well as they might be. Business is good; I've got four men working pretty steady, but still I don't seem to get on as I should. There is certainly something wrong."

"Have you looked into your business? Have you tried to find out just where your business system is off?" and the Editor questioned his visitor carefully about his prices, costs, etc.

"As far as I can determine, I should be making a good profit" returned Deamers. "I'm getting slightly more than the other two smiths down there, but of course they work alone—they have no help, and own small tumble down shops. I don't think either one of them is getting rich—they're simply making a living. I'm making a living, but should be laying something away in the bank. I buy stock and materials in good quantities at prices that I think will compare very favorably with what others are paying. But still I don't seem to be able to put away what I ought to."

"Well, Joe," began the Editor. "How about business leaks? You know it makes no difference how much water you pour into a leaking barrel you can never save any of it until you stop up the leaks. From what you've said I'm of the opinion that business leaks is your trouble.

"There are five important leaks that contribute to business failure" continued the Editor, holding up his fingers. "First, there is the want of proper knowledge of business costs. Not alone the actual cost of goods, of stock, of supplies, but the cost of doing business, the cost of doing certain kinds of work. And ignorance along these lines makes it simply impossible for you to charge for work so as to make a profit.

"If you haven't a regular price list your men are probably doing work for prices that you would never agree to if you were at the shop—that is another leak.

"Then there are many items and little jobs, done in every shop, that do not pay. In fact, they are generally considered a losing proposition."

Here Deamers started to interrupt the Editor, but the latter stopped him.

"Don't interrupt, Joe. I'm coming to suggestions for stopping up the leaks. Just wait a minute." Then, continuing, the Editor said "Your fourth leak is the hiring of one or two men when you don't need them, or on the other hand, not having enough help, at least temporarily, through the rush season.

"And last, but by no means least, is the leak of overbuying—purchasing stock in big lots.

"Now, that line of five leaks, I think, solves your business trouble. The leaks, as I have stated them, generally tell you how to solve them. To stop leak number one it is up to you to find out just exactly what your expenses are. Don't overlook anything. Figure in taxes and insurance, water, light, telephone and fuel. Figure a certain percentage on bad accounts; the interest on your investment; your salary and that of your help; advertising, subscriptions and donations; drayage and carting; in short, every single item that enters into your expense of doing business.

"To stop the second leak, make out a table of prices and see that all your men adhere strictly to that list. A good idea is to require the men to keep a strict and accurate memorandum of every job they turn out—then when you are away from the shop you can see just what has been done in your absence.

"The third leak is the one that probably sinks many a good business ship—how to turn unprofitable items and jobs into profitable ones. In the smithing business I think the solution to the problem can be brought about by side lines. Take any jobs that you cannot charge at a correct figure without making the customer think you are overcharging him. If you sold whips or axle grease or any of several lines that are profitable you could possibly make a sale when the customer brings in the little job, and thus turn an unprofitable job indirectly into a profitable one.

"And this brings to mind an example of this very same thing that I came across just the other day. Postage stamps and directories are inseparably linked with drug stores in all cities and towns. A progressive druggist located on a busy corner found himself and clerks handling a good many stamps every day. And the number of times they pointed out the directory to a passing customer (?) was surprising when they kept count. The druggist then placed a neat desk on one of his show cases in the rear of the store. Just above this desk he hung a neat sign reading as follows: 'Stamps, Directory and Writing Materials here.' On each side of that desk and facing it in such a way so no one could help seeing them he placed a pyramid of shelves. And on these he placed small articles with price cards attached. That stamp desk now pays a good profit. In talking with the druggist he told me that he now scans the market for just such items as will sell at his stamp desk at a profit."

"You don't expect a smith to put a counter of that kind in his shop, do you?" questioned Deamers.

"No, certainly not" returned the Editor with some heat. "But you can certainly learn a good many things from other business men. Take the druggists for instance. How many things do they sell that come directly under the head of drugs and medicines? Just look at the long list of side lines they handle—cigars, candies, soda water and cold and hot drinks, writing papers and goodness only knows what else. And one druggist I know pays his rent —and a high rent at that—out of his cigar trade alone.

"But to get back to business leaks, your fourth leak suggests its own remedy. Employ just enough men at all times to take care of your work. A good force of men should be able to speed up sufficiently at rush times to make it unnecessary to employ any additional help.

"When you purchase stock in large quantities you not only add to its cost on account of the necessity of storing it but, in many cases, you cannot take advantage of the discount on account of the size of the bill, which, if it were smaller, you would be able to pay promptly on the discount date.

"Now, I believe we've covered the problem pretty well in a general way. I think if you will apply these suggestions directly to your business you'll find yourself putting away at least something every month."

"I am very glad this matter came up for discussion, Mr. Editor," said Deamers, rising and slipping into his coat. "You have given me several things to think about and I am quite sure I know where to look for my leaks." And with a hearty "thank you" Deamers went out.

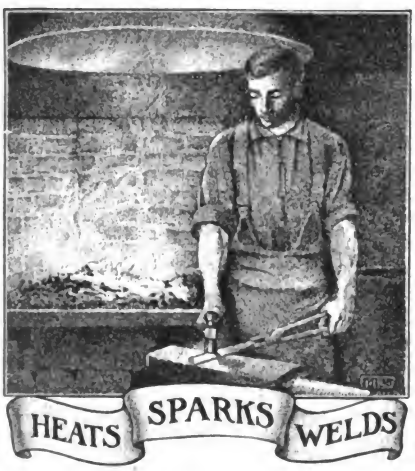
Sharpenin' Time.

W. O. B.

When et's the queerest time o' year—
When fall has gone 'fore winter's here
An' wether's kind o' chillin;—
Say 'bout the time November's thrue
Er December First ses: "Howdy do"—
Jes' long about hog-killin'—
Thet's jes' the cur'ousest season then,
With grain an' stock in bin an' pen,
When fiel's air bare, when trees hev shed
Thur leaves, when most the burds hev fled—
Thet's—sharpenin' time.

When one day's jes' es cold an' raw—
An' when, jes' like es not, a thaw
Will follow with a gale.—
When after thet a spell o' rain,
An' then it'll freeze an' thaw again,
Er snow, er rain an' hail,—
When mebbe 'long the second week,
Jes' when yer mitts an' furs y' seek.
Thur'll come a spell es warm, by crack
Y'd sware thet summer's comin' back—
Thet's—sharpenin' time.

An' when thur bussier 'en a bee
Down at the shop o' Big Hank Lee—
Husslin' from morn t' nite.—
When sometimes in the lamp lite, too
Y'll see 'em puttin' on a shoe
Er pullin' clinches tite,—
Thet's hustlin' time fer Hank, an' he,
Instead o' loungin' like you er me,
Jes' digs rite in t' make a pile,
An' salts it down t' last a while,—
In sharpenin' time.



Cheapness, no matter in what line, is expensive.

The way a smith keeps shop is usually the way the shop keeps the smith.

Troubles never grow large enough to bother the man who is the right size.

Some men enjoy nothing better than to roll up their sleeves and—boss the job.

Some men are so slow they don't do anything but get old, and it takes them an awful long time to do that.

Of course you are going to observe Thanksgiving Day—and with real thanks—in the way it should be observed.

Uncle Billy Martin says: "Don't never try t' tie yer shoe when yer crossin' thro' yer nabor's mellon patch."

If you're not making any profits you're likely making expenses. Write to the Secretary today—he can help you.

If some men used as much energy in getting ahead as they use in getting even, they would find success staring them in the face.

There's lots more to smithing than wearing a leather apron. It isn't the apron that makes the smith nor the sign over the shop door.

What do you say about "Our Journal?" We think we are better than ever and improving every month—what say you? Let us have your ideas and suggestions.

You say you haven't any—how about bad accounts, waste material and profitless jobs? Again we say stop the leaks, if you don't want your business ship to founder.

Ever hear of a business man winning success by nosing about the business of his competitors? Business successes are made by making a business of attending to business.

You never did and never will see a quack medicine, fake gold mine or other questionable advertisement in this journal. We protect "Our Folks." "Our Journal is published in the interests of "Our Folks."

The shop windows and doors will be closed these coming wintry days, to keep out the cold. But remember they keep in the smoke and soot at the same time. Better plan on a modern forge and blast system.

The man who works like a slave usually gets a slave's wages—three meals a day and a place to sleep at night. It's the man who works with mind as well as body who gets the extras—he who mixes brains with his work.

A good coat of whitewash on the shop walls now will go a long way toward making the shop light and cheerful this winter. If you haven't whitewashed the walls do so right now. You'll be surprised with the good results.

How will people know you are the best smith in town unless you get a chance to do their work? How can you get a chance to do their work unless you advertise? There are lots and lots of ways to advertise a smith shop.

Two ways are there of increasing profits—either by cutting costs or by raising the selling price. Any other raise or cut diminishes your profit. Yet there are smiths who seem to think that a cut selling price is a cut at costs.

Are you putting something away for a rainy day? No matter how much or how little, do place something aside. It's surprising how quickly a pile will grow if something is placed on it regularly every week. Just try it and see. And then it may come in pretty handy some time.

Duralumin is a new alloy of aluminum. It is a little heavier than pure aluminum but it is as strong as steel. It can be rolled, drawn, stamped, extended or forged at suitable temperatures, and is much less easily corroded than other aluminum alloys. It is one third the weight of brass.

Friend Tardy is not nearly as slow as you may think. You remember his sign—it came within an inch of hitting a customer on the head one day last winter—well, he has started to repaint it. Of course, it was some six weeks ago when we found him at work on it—but the fact remains—he has started.

Business is business and must be done in a business way. And it's business to keep a record of what the shop owes you. Of course you know what customers owe you, but you are also putting time and money into your shop, and what it owes you is just as important as what your customers owe you. Keep track of it.

Ever think that a collection of old buggies, gears, springs and the like was poor advertising to have laying about the front and side of the shop. Wind and weather do not improve such stock. Better take down such old trash—save out what you can use and sell or burn the other. Don't let it hang 'round year after year.

Boost the craft. You don't approve of the employee who knocks his employer—who knocks the man who pays him on Saturday night—who enables him to live. Then why knock the craft by which you are earning your living and supporting your family? Ever think of it in that way? Answer the next knocker with this.

Own up now—doesn't "Our Journal" deserve just about fifty thousand subscribers? It can't get them without your help. And it's easy—all you've got to do is to get one new subscriber. Just ask the next smith you meet about joining our family of readers. Or perhaps you have a friend to whom you would like to present a subscription.

Do you read "Timely Talks With Our Subscribers?" Every item on that page is addressed to you. When you don't read it you are missing something valuable. And then, too, don't forget the Heavy Hardware Prices and the Wanted and For Sale ads. In short there's not a department or page in this entire issue that you can afford to miss.

The village smithy is no longer content to simply stand "under the spreading chestnut tree"—he has already succeeded in flying over it. Charles Snyder of Ohio has been experimenting with and working on a monoplane for the past three years. Recently he made several flights, one of which was for half a mile at an elevation of 200 feet. Mr. Snyder's machine is said to be unlike any other present make of air craft.

Don't wait another day before ordering some of those calendars for advertising your business. Our 1911 calendar is considered by everyone to be the best we have ever published, and you will surely want some for your own business. And you'll need to get your order in quick if you don't want to be disappointed. There's no better way on earth to advertise a smith shop than by means of appropriate calendars. Surely you can afford to spend four cents to get a new customer. Let us have your order by next mail for a supply of these trade winners.

What is your attitude toward the shop and smithing business in general? Are you whining and knocking or are you traveling along with "Nothing so good as smithing" on your lips? Are you putting head, heart and soul into the trade? You can't expect to get anything more out of the trade than you put in. You can't expect to reap dollars if you put in only pennies. Put real, energetic effort into shop and work. Be in the shop not only in body but with heart, head and soul as well. Then—can your harvest be anything but what you want it to be? Success will stare you in the face.

American Association of Blacksmiths and Horseshoers.

Are the prices which you are now getting for work high enough to afford you a good living from your daily labor? Do you think you are receiving sufficient compensation for your days of hard work? The price of stock and material has gone up greatly, as you know, and the cost of living has also been increasing. Have the prices which you have been getting for work day by day been advancing in the same proportion, or at all? We are sure that in every section of the country the prices are not as high as they ought to be at the present time, considering everything, and in many cases it is reported that the smith is unable to make a good living for himself and those dependent upon him.

This should never be at the present day, when the whole country is so prosperous. No one will deny, not even the right-minded farmer, that the smith should have more money for his work today than he received for the same work a few years ago, when general prices were lower. No other craftsman on the face of the globe works as hard as the blacksmith for the money he gets, and it is high time that there should be a general advance in prices on all blacksmithing and horseshoeing work.

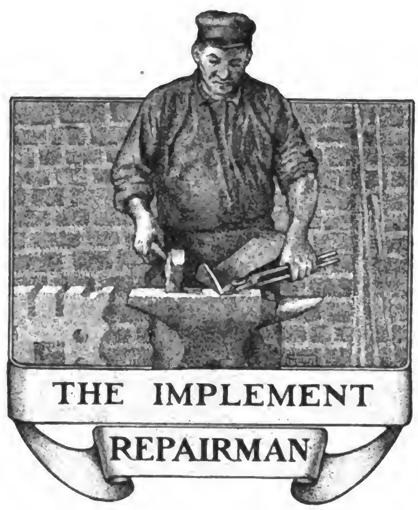
The principal reason why the prices for shoeing and blacksmithing have not gone up is because the smiths in the various sections do not coöperate with each other as they should. One man is afraid to raise his prices for fear that his neighbor will not raise, and will, therefore, take his trade from him. If all the smiths of a given county can be brought together to adopt prices for work, they can then be sure of getting the amount of money they rightfully earn and richly deserve.

The American Association of Blacksmiths and Horseshoers has been incorporated under the laws of New York State for the purpose of promoting the welfare of the craft. It is the intention of the Association to place in the hands of the blacksmiths, horseshoers and wheelwrights of every county the means and opportunity to organize and secure higher prices. The time is ripe, and the opportunity does not come every day. Will you personally take advantage of it? Everyone can see the benefits which such a movement will bring, and coöperation is all that is needed for success.

If you are in favor of such a movement please lend your support. Will you back it? We have already organized several counties and have raised their prices. Bear in mind that this thing cannot be done in a day, but will require united persistent effort, and if you expect to share in the benefits you must lend your own personal support. Throw aside all petty jealousies for your own good, and talk it up with your neighbor smiths.

Let us all get together and lend our efforts to make this thing a success. We can do it in your county, for it has already been done in others. The support which any one craftsman can give is small compared to the benefits to be obtained if we succeed, and succeed we can, if each one helps. Will you make the effort in your county? Will you help to make prices better in your county? Anything worth having is worth a little effort. All you need do is to ask for "Easy Plans for forming a county organization"—and a penny post-card will do. Address it now—today to

THE SECRETARY,
Box 974, Buffalo, N. Y.



Home-Made Tools vs. Factory-Made Tools.

J. W. SMITH.

I have just read an article in this month's issue of your magazine, written by Mr. J. Vestal, which seems to me to be one of the most ridiculous ever written by a man who calls himself a blacksmith. He writes sneeringly of a man who writes to ask the best way to make a hand hammer, when "he could go to a hardware store and buy a better one for forty cents than he could make in four hours." Such talk sounds very much like raving. The man asking the information probably served his apprenticeship under some just such a smith (?) as this, under the pretense that he was learning the trade. How in the world a blacksmith could put in four hours' time making a hammer, I don't know. When I served my time it was in a large smithing shop and there were sixteen apprentice boys. We were all taught to make all our tools, and I have never seen a real blacksmith yet who could not forge a good hammer ready for the handle in one hour or less. I once saw a blacksmith named Russell (lived in San Francisco) forge a hammer and put the handle in it in forty minutes. The idea of putting in four hours' time on such a little, simple job as this is ridiculous.

Mr. Vestal also spoke in a sneering way about an old man who came to him to have some draw-knife handle turned, the old man claiming that one of his draw-knives was worth half a dozen of the kind you buy. And if this old fellow understands his business (and I should judge that he does, otherwise he would have no customers for these tools), he is dead right, and the mechanics who buy tools from him would not want factory make. I have one of the factory-made draw-knives in my shop that cost me \$2.50. Anybody that wants it can have it for \$ .25, as I much prefer my own make, the other being useless. The ship carpenters on this coast (California) send all the way back to some old fellow who has a little one-horse shop some place in New Brunswick to have all their tools made. This goes to show how much factory tools are thought of by mechanics. A botch can get along with any old thing, and their work shows it. I have only had two apprentice boys who have learned their trade with me; one of them is foreman in a shop in Gilroy; the other is foreman for the S. P. R. R. Co. And you can just gamble that these boys could make themselves a hand hammer when they left my shop. And it didn't take them four hours, either.

In regard to Mr. Vestal's questions about axle setting and wheels, I will not answer it, as I should judge that it would be very hard to explain anything to him or make any sketch that he would understand.

I am not "an old crank"—I am only forty-four years old, but have spent the most of my life at the forge, and am proud of it.

Gun and Novelty Repairing—17.

W. G. MUMMA.

Receipts, Formulas and Notes.

To make a welding compound for steel, use borax and fine steel borings.

To prevent rust, dissolve one ounce of camphor in one pound of melted lard, remove the scum, mix as much lead with lard and camphor as will give it

an iron color, clean the machinery well, smear with the mixture, and after twenty hours rub off, clean and polish with a soft cloth.

To make durable and permanent joints between rough cast-iron surfaces, mix asbestos and a small quantity of white lead sufficient to make a very stiff putty. This will resist any degree of heat and is not affected by steam or water.

A good rouge powder may be made by exposing very pure, clean crystals of sulphate of iron to heat.

To drill and file hard castings or hard iron use turpentine on drill or file; you will be surprised at the result.

To anneal steel for filing and drilling, heat to a low red and bury in slack lime or forge dust and let it cool gradually.

To caseharden anvil tools made of iron, heat to a bright red and rub on prussiate of potash or cyanide of potassium and cool in water immediately.

To temper small springs, etc., heat to a cherry red and cool in rain water, dip in lard oil, hold over the fire until the oil burns off; repeat the oil dip twice, move and then cool in oil. This is reliable if done properly.

To temper knife blades of thin steel without warping, lay the blades between two pieces of iron, bolt together and heat to a cherry red, cool in rain water and draw temper by dipping the back of the blade in hot lead until you get a dark stone color on the edge, then quench.

A good and reliable welding compound is made of two parts of borax, one half part of sal ammoniac. Mix and melt them together. When cold reduce them to a powder. Use same as borax.

An every-day welding compound is made of one pound of borax, one quart of clay (common), one handful of salt. Grind together and it is ready for use. Very reliable for every-day use.

To weld a buggy spring, scarf each end, punch a little hole half an inch from each end, lay a thin piece of iron between and then rivet together and heat to a low red, put iron scales on first and then some every-day welding compound, heat slowly and you will get a good weld.

When working steel, never be in a hurry. For edge tools, heat slowly and do not heat too hot. When you draw tool out, do all you can at one heat and finish with a wet hammer and anvil until almost cold. To temper, lay piece of steel on top of a slow fire and heat very evenly before you temper.

Never upset a cold chisel; rather draw it out and cut the end off. Do the same with stone cutters and similar tools.

To restore burnt steel, heat to a red, cool in water and repeat two or three times. It will restore steel, to a certain extent.

To weld low steel or iron to malleable castings, use one part of sal ammoniac, ten parts of borax. Melt together, then grind fine.

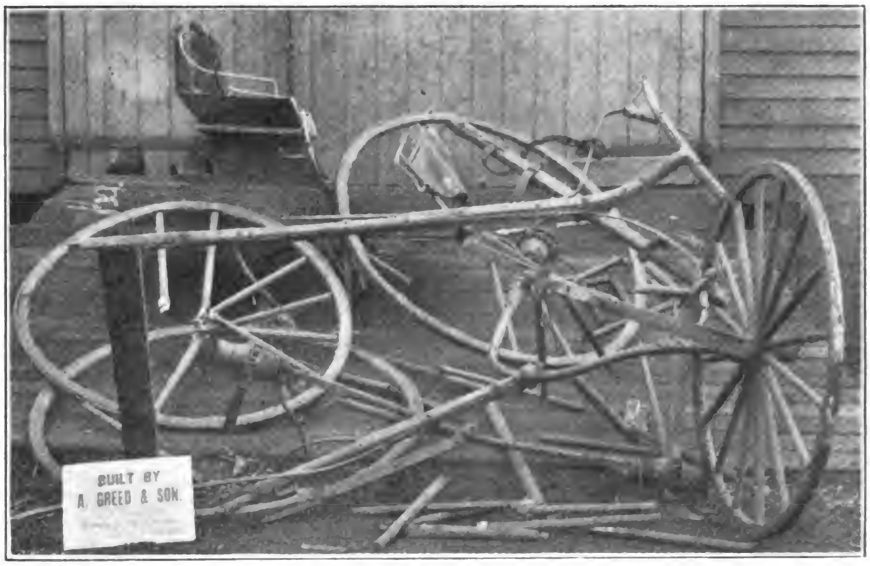
To temper hand hammers, heat the face to a cherry red, cool in rain water about one inch deep, then let temper draw to a dark straw color. Put the hammer face in a cup of half an inch of lard oil and let cool in the oil.

To temper mill picks, stone tools, etc., take half a pound of concentrated lye, dissolve in one gallon of rain water, heat steel to a cherry red and dip in the solution one inch, draw to a straw color. If done properly the steel will stand the hardest stones.

To finish hardwood. If it is open grain it should first be stained for the desired finish, then it should be filled with a paste filler colored to match the stain, then give it a coat of shellac varnish. When dry, sandpaper lightly with some partly worn paper, this will act as a binder to keep the subsequent coats of varnish from sinking into the wood in spots. Use a first class body varnish, used for furniture work. Put on more than one coat as the case may require. When dry, polish with powdered pumice stone mixed with water.

The best way to clean furniture and hardwood work is to use kerosene oil applied with a rag and afterwards thoroughly wipe off with a clean rag or clean cotton waste. Be sure to get off the oil completely, so that there will be none to act on the varnish. It will clean off all dirt completely. It should be rubbed off until clean and dry and should be done immediately after it is put on. It is a dirt remover of the best kind.

To make blackboard paint, take and mix: 4 pints of alcohol, 8 ounces of shellac, 12 drams of lampblack, 20 drams of ultramarine blue, 4 ounces of powdered rotten stone, 6 ounces of pumice stone.



THIS BUGGY WAS HIT BY A RAILROAD TRAIN AND, WHILE IT WAS BADLY SMASHED, THE DRIVER AND BOTH HORSES ESCAPED INJURY. PHOTO SENT BY MR. A. GREED, OF VICTORIA, AUSTRALIA

Powder first and dissolve the shellac in the alcohol—then add the other ingredients finely powdered and shake well. To apply the slating, have the board smooth and perfectly free from grease; pour out a small quantity only into an old tin can and apply it with a new flat varnish brush as rapidly as possible. Instead of alcohol you can use a solution of borax in water. Dissolve the shellac in this and color with lampblack. Dilute silicate soda (water glass) with an equal bulk of water and add sufficient lampblack to color it. The lampblack should be ground with water and a little of the silicate before being added to the rest of the liquid.

Copper by being mixed with tin will be so hard that edge tools can be made of it.

A good cure for burns is a solution of bicarbonate of soda. It promptly and permanently removes all pain. The points to be observed are. First, that washing and common soda are far too irritating to be applied. Second, the

solution must be saturated. Third, the solution must be ice cold. Bicarbonate of soda only must be used.

To make a good paste for paper work, take wheat flour and mix thoroughly with water to a thick batter. Be sure that there are no lumps. Put in a little rosin and alum, pulverized, then put on a water bath and cook it until it becomes a thick paste. It is then ready for use. A little oil of cloves will make it keep longer.

A cement for belting is made by taking good glue and isinglass, equal parts, soak for ten hours in just enough water to cover it. Then bring gradually to a boiling heat and add pure tannin until the whole becomes ropy or appears like the white of an egg, buff off the surface to be joined and apply this warm and clamp up tight.

A cement made of very finely powdered oxide of lead, lithrage and concentrated glycerine unites wood to iron with remarkable efficiency. It is insoluble in most acids and is unaffected by the moderate action of heat, sets rapidly and acquires an extraordinary hardness.

and increases the elasticity of the steel.

In filing copper, the files should be well chalked, and in cutting it in the lathe use plenty of soapy water. For polishing copper, only the softer polishes should be used; as rotten stone, prepared chalk and soft rouge.

Copper may be welded by the use of proper fluxes. The best compound for this purpose is a mixture of one part phosphate of soda and two parts of boracic acid. This welding powder should be spread on the surface of the copper at a red heat. The pieces should then be heated up to a full cherry red or yellow heat and brought immediately under the hammer, when they may as readily be welded as iron. Be careful that no charcoal or other solid carbon comes into contact with the points to be welded. It is best to heat the copper in a gas flame.

A cement that will stand both water and heat. Take freshly calcined oyster shell lime, sift it well and grind fine, make into a paste with white of eggs, apply to the fracture and press the broken pieces firmly together.

The following will stand water but will not stand heat. Four parts of gum shellac, one part borax. Boil in water until the shellac is dissolved and keep on boiling until the mixture is of paste-like consistency. When required for use heat again and apply to the fracture with a clean brush.

MR. F. E. BILL'S GENERAL SHOP OF MINNESOTA

A cement to hold pieces in a lathe for turning. Melt one pound of rosin in a pan and add one quarter of a pound of pitch. While these are boiling, add brick dust until by dropping a little on a cold stone you think it is hard enough. In winter it may be necessary to add a little tallow. A piece of wood can be fastened to a chuck by this cement, and when done can be removed from the chuck by a smart blow of the tool. Traces of the cement can be removed from the work by means of benzine.

Tempering with oil prevents oxidation

Etching liquid for steel. Mix one ounce of sulphate of copper, one quarter ounce of alum, one half teaspoonful of salt (reduced to powder), one gill of vinegar, 20 drops of nitric acid. This liquid may be used either for eating deeply into the steel or for imparting a beautifully frosted appearance on the surface, according to the time it is allowed to act. Cover the parts you wish to protect from its influence with beeswax, tallow or similar substance.

To clean bottles having old oil, varnish, rosin, etc., in them, use a mixture of sulphuric acid and powdered bichromate of potassia. This will destroy all organic matter and when washed in pure water will be found perfectly clean.

To tin iron. The surface of the iron is cleaned from scale by sulphuric acid and then scoured with sand. It is then coated with a strong solution of chloride of zinc and then dipped into melted tin. The tin will instantly adhere to every spot that is clean.

Fine lubricating oil. Put fine olive oil in a bottle with scrapings of lead and expose it to the sun for a few weeks—pour off the clear oil for use. Another method is to freeze fine olive oil, strain out the clear portion and preserve for use.

Plumbago or black lead as a lubricator can be used on the heaviest work or the lightest watch work. When applied to delicate machinery it should be applied with a brush, thus avoiding grit. It seems to be well adapted to diminish friction on porous surfaces, such as wood and iron.

An anti-friction mixture. Mix four pounds of tallow or soap and one pound of finely ground plumbago. This makes the best lubricator for wood working on wood. Excellent for wood screws where great power is required.

Metals are polished either by burnishing or buffing. The process of burnishing consists in rubbing down all the minute roughness by means of a highly polished steel or an agate tool. None of the metal being removed it will take on a fine, polished surface.

Buffing is done by rubbing the metal with a very fine polishing powder. The rubbing is sometimes done by hand, but the best way is to make the buff in the shape of a wheel which revolves rapidly in a lathe or other machine and the work is held against it. The best polishing powder is crocus or rouge.

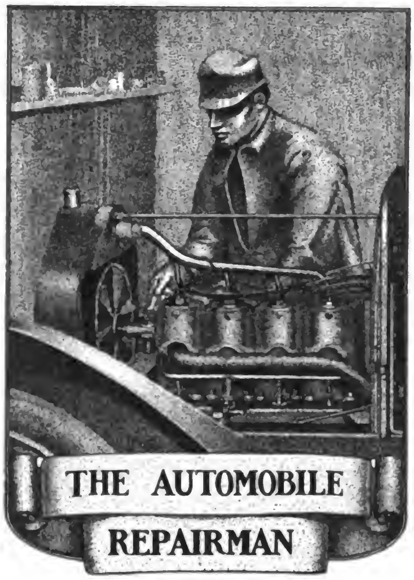
The principal polishing powders are chalk or whiting, crocus or rouge, emery, oilstone powder and oxide of tin called tin putty. Prepared pumice stone powder is sometimes used, also rotten stone. All of these can be bought ready made.

Rosins are Copal, Amber, Dammar, Shellac, Elemi, Sandarch, also the common rosins. All of these rosins can be reduced to powder, and be either dissolved in alcohol or turpentine, and

form the base for most of the varnishes and lacquers.

Vienna lime and alcohol give a beautiful polish to iron or steel. Select the soft pieces of lime, such as can be easily crushed by thumb and finger, as they are most free from gritty particles. Apply with a cork, a piece of soft pine wood, leather or chamois skin.

(*To be continued.*)



The Chalmers-Detroit.

The Chalmers-Detroit people make two chassis models, the "Thirty" and the "Forty." The "Thirty" has a wheel base of 115 inches, while the "Forty" has a 122-inch wheel base. In Fig. 1 is shown a model on the "Thirty" chassis, fitted with pony tonneau. In Fig. 2 is shown the "Thirty" chassis from the left side, while in Fig. 3 the same is shown from below. The power plant is supported at four points on the sub-frame. The oil reservoir is shown in place on the bottom of the motor. Fig. 4 is a near view of the motor from the intake side, and shows wiring, valve mechanisms, carburetor, steering shaft, etc. The wires, as shown, are insulated and for further protection carried alongside the motor in a brass tube. In Fig. 5 the motor is shown from the top. Here are shown the large intake valves in the cylinder heads. The exhaust valves are at the side. The removal of these valves exposes the entire combustion chamber for cleaning. Double sets of spark plugs are shown.

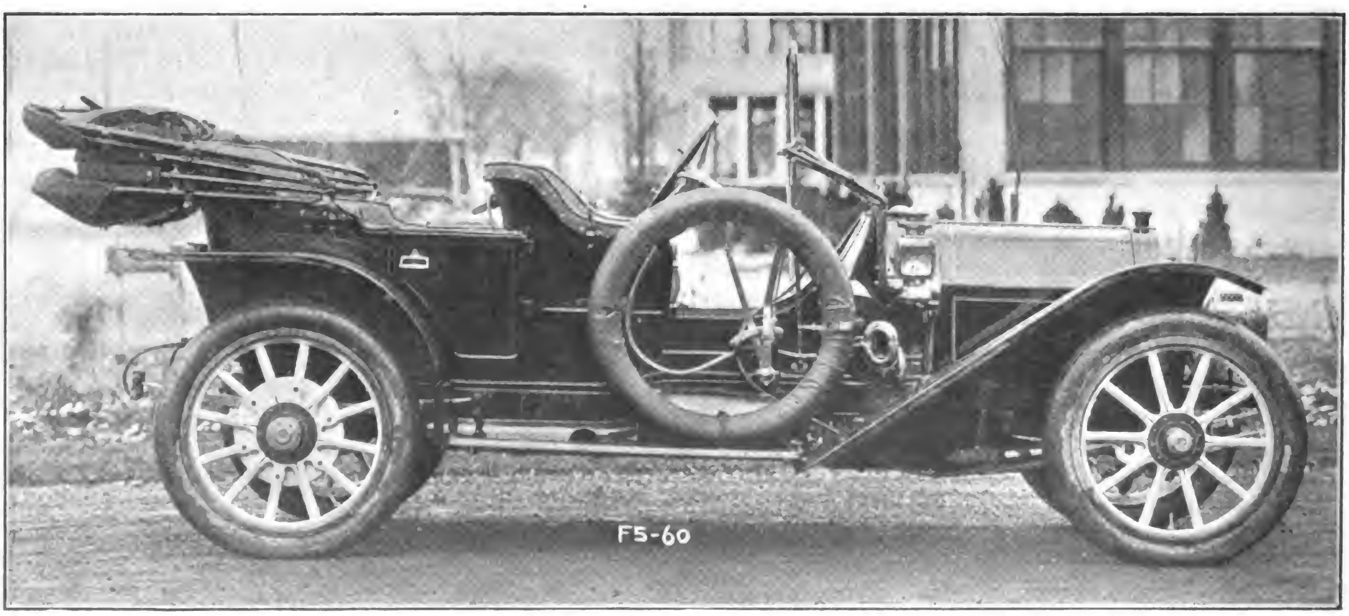
Troubles With the Ignition System and How to Remedy Them.

HAROLD WHITING SLAUSON, M. E.

Whenever the explosions in one or more cylinders of an automobile cease altogether, or occur only intermittently, it is almost certain that there is some trouble with the ignition system. Although trouble will be found here more frequently than in any other mechanism of the motor the difficulty is easily traced, and it does not necessarily require an experienced electrician to remedy matters. There are some instances, notably when trouble with a magneto is encountered, when the part must be returned to the factory, but in the ordinary battery system of ignition almost any repairman should be able to locate and repair the difficulty.

Nearly all of the older styles of automobiles, and many of the present-day cheaper models, use dry batteries as the source of current for the ignition in the cylinders of the motor. These batteries are similar to those used for telephone and doorbell work, and are familiar to everyone. From four to six are required for a set, and each set is wired in series—that is, the positive pole of one is connected to the negative pole of the next, and so on. This method of wiring gives the amperage of a single cell and a voltage equal to the sum of all the batteries. One of the most necessary instruments, aside from his tools, that a repairman can have is a combination volt-ammeter, a watchlike arrangement that will read either the volts or amperes delivered by any battery with which it is connected.

The ordinary dry battery should show about 1½ volts and from 20 to 30 amperes when new. It should not be assumed, however, that merely because a set of batteries is new the amount and pressure of the current will be as high as necessary and, consequently, each one should be tested separately. As the batteries are used, the voltage will remain practically constant, but the amperage will be gradually reduced. When the cells begin to show but ten or a dozen amperes, close watch should be kept on them with the instrument and no long trips in the car undertaken without carrying along an extra supply. When the batteries have been used to the extent that they deliver but six amperes they should be replaced with a new set, for good and reliable ignition cannot be obtained with a current as low as this. Dry cells will deteriorate, even when not in use and, consequently, only the newest batteries should be installed. It is difficult to state just what service a set of batteries



CHALMERS-DETROIT—30 HORSEPOWER PONY TONNEAU

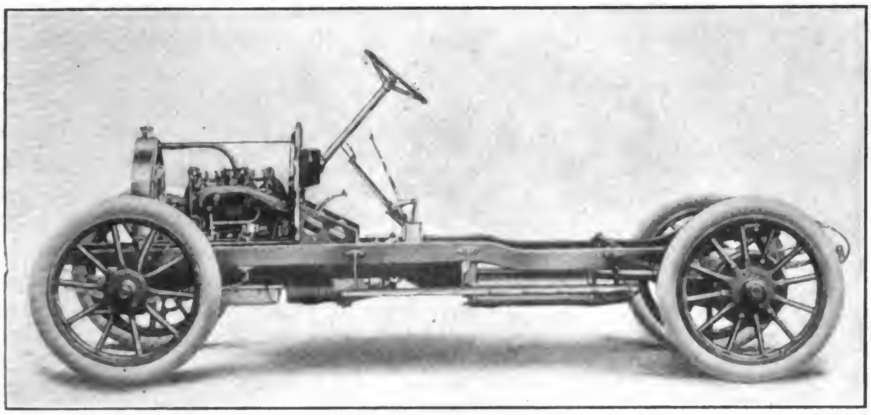


FIG. 2.—SHOWING A SIDE VIEW OF THE CHALMERS CHASSIS

should give, as the length of life and efficiency of cells of even the same make will vary to a great extent. Cases have been known in which a set of half a dozen dry batteries have run a car over a thousand miles, and yet the next set might be able to furnish ignition current for only one tenth of that distance.

A dry battery, if allowed to rest at intervals, will recover its strength to a certain extent, and for this reason it is not advisable to use one set continuously. If two sets of batteries are wired up so that either may be used at will, the length of life of the dozen batteries used alternately will be much greater than if one set were used till exhausted, and then the other treated in the same manner. "Two-way" switches are provided on most cars, by means of which the current may be taken from either set of batteries at will.

From the preceding paragraphs it is evident that when a car apparently suffering from ignition trouble is brought into the shop the batteries should be tested at the first, and all weak cells replaced by new ones. A set of weak batteries will not necessarily cause the motor to stop entirely, but it will cause skipping in one or more of the cylinders.

If the batteries are found to be strong, the spark plugs should be removed and examined. This is, of course, assuming that the motor is of the jump-spark type, but, as this style of ignition outnumbers the make-and-break probably five to one, the latter system will not be considered. The points of the spark plug, across which the current jumps should be about 1-32 of an inch apart and the ends should be perfectly clean. One of the points is generally a fine wire that can be bent to the proper position, and this is consequently an adjustment that can be made easily. If there appears to be a collection of soot or carbon around either of the electrodes, or lower terminals of the plug, it should be treated to a liberal dose of kerosene, and then polished bright and clean with emery cloth. A thin instrument such as the small blade of a knife, or point of an awl, should be inserted in the circular space between the outer shell of the plug and the inner, or central, electrode to which the spark jumps. Soot will often collect in this cavity, and if it appears in sufficient amounts it will often short-circuit the current and prevent it from jumping the air gap—which it must of necessity do in order to form the spark.

After the spark plugs have been adjusted properly and cleaned, they should be laid on their sides on the top of the cylinders so that the large nut on each plug will come in contact with the iron of the cylinder. Care should be taken, however, to see that the upper terminal, or part to which the wire is attached when the plug is in position, does not touch any metal. If the proper wires are connected to the plugs as they lie in this position the nature of the spark delivered by each can be observed if the switch is thrown and the motor turned over slowly by hand. The spark should be a blue-violet in color, and should remain constant in each plug as long as the connection is made through the timer when the motor is turned over. It should be remembered, however, that the hot gases and high compression in the cylinder offer a greater resistance to the spark than does the ordinary atmosphere and, consequently, what may seem like a good spark when the plug lies on the cylinder head will not be so efficient when these conditions are different.

If one cylinder misses entirely, and no spark can be obtained from its plug it is almost certain that there is a broken connection in the wiring leading to that part of the car. In like manner, if no spark can be obtained from any of the plugs, it is evident that a wire is loose or broken, either in the batteries or one of those leading to the coil or switch. A broken connection at one of the batteries would cause all cylinders to miss fire. An occasional miss in any or all of the cylinders will often indicate that one of the battery connectors is loose, but still in contact with the battery terminals. Tightening the binding screw on the loose terminal will generally remedy this trouble.

It was stated above that the voltage of a single cell was about 1½, and that, consequently, the entire voltage of a set of six batteries cannot be over 9 volts. But the ordinary jump spark, or high-tension system of ignition, will sometimes jump nearly an inch when in the open air. To jump an air gap of one inch requires a voltage, or pressure, of approximately 20,000 volts. As this tremendous voltage cannot be obtained from the batteries alone, a transformer, or induction coil, is placed in the circuit which serves to raise the pressure of the current with a proportionate decrease in the amperage. A coil is generally used for each cylinder, and as many as are used are placed in the coil-box, located

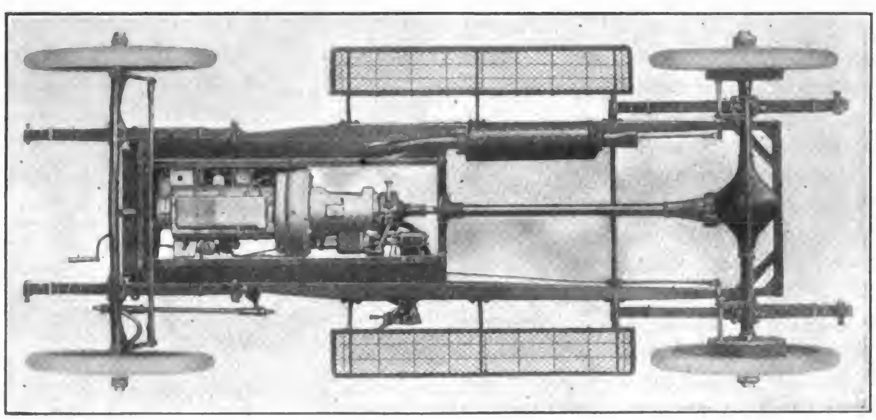


FIG. 3.—A TOP VIEW OF THE CHALMERS CHASSIS

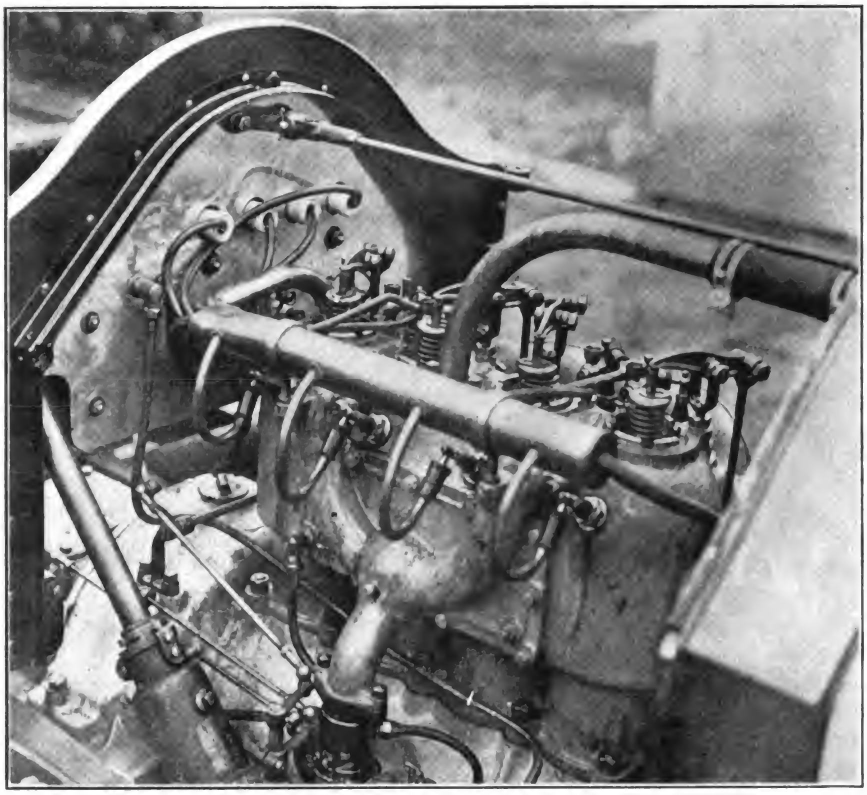


FIG. 4.—A NEAR VIEW OF THE CHALMERS MOTOR

on the dash of the car. There are some systems by which the high-tension current from a single coil is distributed to each of the four cylinders, but that is merely a refinement, or variation, that does not affect the general principles of ignition troubles and remedy.

(*To be continued.*)

Gas Engine Starting Troubles.

J. N. BAGLEY.

When the engine is right it will respond to the first few turns of the wheel. If it fails to do this, something is wrong, and it is useless to crank it. If it fails to start, examine the compression, for poor compression adds much to starting troubles. Some of the causes of poor compression are: improper valve seating, sticking of the valves in their guides, worn or broken rings, leaks around the spark plug, a bad cylinder wall, or a gasket blown out. Many times the rings will stick in their grooves and expand to the walls of the cylinder. This is generally caused by poor lubricating oil, which burns or carbonizes, sticking the rings. Next in order, the electric mechanism should be tested; the timer may be shorted or a contact may not be made at the terminals, some of the wiring may have the insulation worn away, allowing the bare wire to come in contact with some part of the metal about the motor or frame. The contact points of the vibrator may need cleaning or smoothing up, or they may need adjusting. A wire may be hanging by a few threads, making only a partial contact, or a battery connection may be broken, the batteries may be run down. Battery connections are important factors in the completion of the electric circuit and should be made with pliers. The ground wire is another point to be given attention. Many times it is overlooked because it runs off to itself somewhere about the motor. But this connection is just as essential as any of the connections about the electric mechanism. All connections, as far as possible, should be kept free from oil, for it is but a matter of time before the insulation is oil-soaked and will conduct the current from its regular course.

To adjust the trembler on the coil, turn the wheel over until contact is made at the timer points; close the switch and listen for a buzz. The adjusting screw above the trembler spring should be adjusted until a good, clear buzz is heard, resembling that of a bee; it should not be slow, but a fast, singing sound. When the buzz sounds as it should, turn the wheel over and each time the contact is made at the timer notice if the trembler responds freely. Ofttimes the vibrator will buzz while the engine is running slow, and as the speed increases it will miss occasionally, causing the motor to miss fire. This may be due to the fact that the tension of the spring has been made too strong by the adjustment and does not vibrate properly when the motor is running fast.

All wires should be placed in such manner that they will not come in contact with a hot exhaust pipe, for the insulation would soon be burned away. All connections should be soldered and taped, for it is the only method that may be relied upon. In case the coil itself should break down, it should at once be returned to the maker. Dirty or fouled spark plugs add to difficult starting. If the plug points are carbonized and need cleaning it may be done with emery cloth to good advantage, and, again, the points may be too far apart, so that the spark cannot arc or jump across, or they may be closed entirely, thus shorting the circuit. The proper distance for the points is within about three thirty-seconds of an inch, unless the battery is very weak, when they may be closed slightly.

An excessive amount of cylinder oil in the cylinder will make starting difficult, as the gas will not vaporize as it should. The carburetor is another device which many times gives trouble in starting, for on this depends the mixing

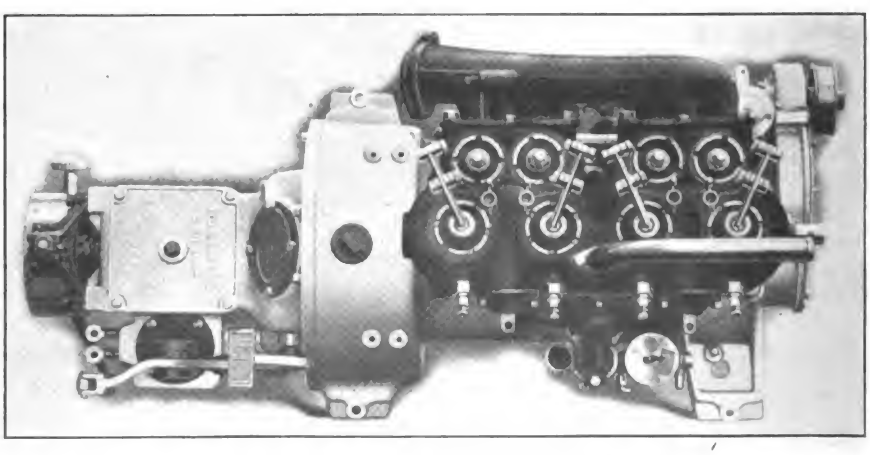


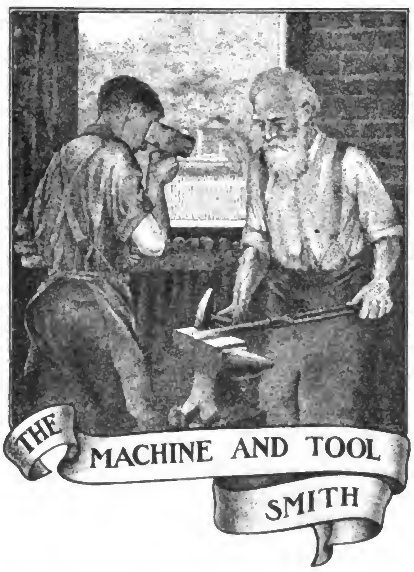
FIG. 5.—A TOP VIEW OF THE CHALMERS MOTOR

THE SHOP OF AN ONTARIO SMITH WHO ALSO ACTS AS GENERAL AGENT FOR FARM IMPLEMENTS

of the gas and air in the correct proportion to make an explosion. Water in the carburetor will often make starting difficult. Water is often found in gasoline, and particularly when the tank is low it is liable to get into the pipes and carburetor. Almost every carburetor has a drain cock at the bottom for draining out the water. A leaky float will be found to affect the height of gasoline in the float chamber, thus rendering starting impossible, owing to the over-rich mixture. A mixture may be made so rich it cannot be ignited, or it may be made so weak it will not ignite.

Sediment in the carburetor will affect the flow of gas from the tank, rendering an imperfect mixture; therefore, it is good practice to strain the gasoline through a fine gauze or a chamois skin to prevent the dirt getting to the tank. An over-rich mixture may be readily found by the discharge from the exhaust pipe, for it is indicated by a heavy, dense smoke, having a very disagreeable odor. On the other hand, if the mixture is very weak, a popping and snapping will be heard in the exhaust pipe, especially if the motor is running very fast. Smoke from an overcharge of cylinder oil differs from a rich gas by giving off a white, dense smoke, and the offensive odor is missing. When a very thin blue smoke comes from the exhaust it indicates a normal mixture and good ignition. A small piece of grit at the point of the needle valve will make starting difficult, owing to the over-rich mixture. In this case, if the carburetor is flushed for a minute, the foreign substance may be removed. The feed pipe or the nozzle may be clogged with lint or dirt, thus affecting the flow from the tank. The float may stick or the needle valve may be corroded from long standing.

In most every cast, if starting is difficult, it may be due to three things, namely—compression, fuel or ignition.



Welding and Cutting with the Oxy-Acetylene Blow Pipe.

JOHN TRACY.

Some three or four years ago experiments were begun on the Great Northern System with xy-acetylene as a welding agent. These experiments at first were confined to boiler work only, and carried on under the supervision of the superintendent of motive power. Proving successful, a system was evolved whereby the work could be carried on on a large scale. The department selected to do the work was the tin and copper department, and results have shown that this was a wise selection, the work being nearer akin to soldering and brazing than any other branch of mechanics, and the construction and care of the apparatus necessary to do the work is in the department to which it naturally belongs. A gas generating plant was constructed and pipe connection made with all pits in the boiler and machine shops. A force of men were then trained to do the work, for much depends on the skill and reliability of the operator, as careless work at any time would mean failure. The manner of procedure is as follows:

To repair a crack in a fire box or other sheet, the crack is V'd its whole length and through the sheet, the groove being cut to a 45-degree angle. The filler used to do the welding is ¼-inch round best Swedish iron. The torch is then applied, heating the sheet and filler together, the melted iron dropping into the groove until it is filled up, when the torch is again passed over it, melting the surplus metal off and making a smooth, solid weld. The average amount of this kind of welding being done is one foot per hour. The pressure at which the gas is used on this class of work is four and one half pounds for the acetylene and twelve pounds for the oxygen, which proportion has given the best results. The same method is followed in putting in a whole or half side-sheet or a patch of large or small dimensions, the sheets being cut at the 45-degree angle and welded in the manner described above.

I may state that the quality of the filling material is considered of much importance, and every bar is tested before using. The selection of the Swedish iron for the purpose being made after experimenting with vanadium and other kinds of steel as well as with the best makes of American iron. As compared with Ewald Iron, the test given herewith proved the superiority of the Swedish Iron.

Swedish Iron.		
Exact size of iron,	2.51″ x .401″	2.51″ x .402″
Tensile strength,	37,000 lbs.	34,500 lbs.
Ewald Iron.		
Exact size of iron,	3.50″ x .402″	2.50″ x .401″
Tensile strength,	30,000 lbs.	28,400 lbs.

Seams welded in this manner are said to stand a test up to 90 per cent of the original strength of the sheet.

As a cutting agent, oxy-acetylene is wonderful, a plate of $\frac{5}{8}$-inch thickness being cut at the rate of 26 feet per hour, the cut being as clean as if done with a saw. The fire-box is cut in pieces and taken out in a marvelously short time. In cutting, acetylene is used at four pounds and oxygen at sixty pounds pressure. As the work progressed, its scope broadened until now it is put to every conceivable use. Cracks in mud ring corners are welded, worn places on boiler sheets filled up to their original thickness, staybolt holes filled, redrilled and tapped out to their original size, small cracks in engine frames welded up, cracks in link and motion work welded, and any and all jobs with cracks or worn parts are taken care of.

To illustrate how this work has grown in volume we are now making six hundred track-leveling gauges of a new design. The material used in making the carriage frames of this device is of $\frac{5}{8}$ and 1-inch steel bicycle tubing, and the six hundred frames will require a total of twenty-seven thousand welded joints. The oxy-acetylene is doing a better job on these than brazing.

Having given you an outline on what is being done in wrought iron and steel I will now take up cast iron. For this work a flux is used for welding, the formula of which is as follows:

Ortho Boracic Acid	(H3 B 03)	-15 parts
Chlorate of Potash	(KC L 03)	- 5 parts
Oxide of Iron	(FE 2 03)	- 3 parts

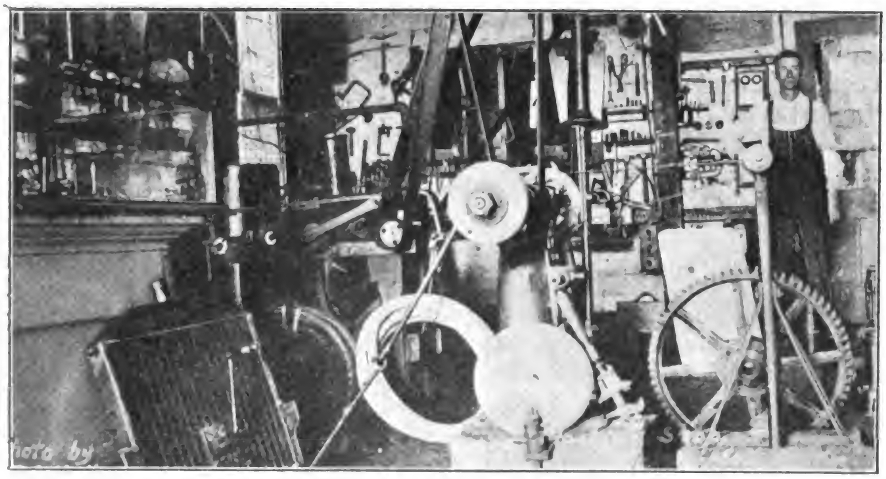
The mixture must be pulverized and thoroughly mixed and kept perfectly dry in a glass jar or bottle.

The trouble with welding cast iron is the carbon or graphite contained in the cast iron. This flux is used to eliminate these two elements. In addition to this flux, when welding cast iron, a filler or solder is prepared of sticks or rods of cast iron, rich in silicon. The rods are about $\frac{3}{8}$ of an inch in diameter and obtained from the foundry. The work done in cast iron consists of repairs of broken parts of machinery, the filling up of blow holes or other defects in cylinder and other castings, cracked spokes in driving wheels, and we have even welded in new spokes in driving wheels where they have been altogether broken out. In fact, to such an extent has this work grown that there are five men now employed welding and cutting. That the work is a big paying proposition has been proven without the shadow of a doubt, and that its possibilities are still greater is also certain.

Frogs, Crossings and Switches.

J. GEO. JORDAN,
Foreman, T. & N. O. Shops.

Frogs, crossings and switches are very important materials on a railroad, as on them depends the safety of the public. If this material is not properly constructed it may cause a wreck at any time. In olden times frogs and crossings were constructed entirely in the blacksmith shop, but of late years most of this material is made in the machine shop. I remember when we cut all the frogs out with chisels, had them drilled, and completed them all in the blacksmith shop. The larger rails then were 62 lbs. Now most of the frogs, crossings and switches are constructed on our line out of 80 and 90-pound rail; hence, we have to get up-to-date tools to construct this material, such as rail planers, rail saws and up-to-date drill presses, bulldozers and rail-bending machines, so you can compete with factory prices, and that is a hard thing to do in a railroad shop.



F. C. SHERWOOD'S WELL-EQUIPPED MISSOURI SHOP WHERE HE DOES ALL KINDS OF PLUMBING, STEAM AND AUTO WORK

We still make a great many new frogs and switches at our shops in Houston, but the most of them are bought from the frog and switch works, as our shop is not large enough to make all of them; the most we have to contend with is repair work. About two years ago we were swamped with repair work, on account of the change that had been made on all spring frogs, from a clamp frog to a solid filler frog, bolted on, and a different spring had to be put on. The creeping device had to be changed in about 250 spring frogs.

We have a place we do this work just outside of the blacksmith shop, 20 feet wide, 75 feet long, with flooring and shed roof over it, and have special men broke in for this class of work. The longer you keep men on this class of work the cheaper you can do the job, as they will get to be experts. We have templates for the different number of frogs to lay the holes off with, but the planing is by measurements; the rail is all cut off, according to a blue-print which is furnished us by the engineering department, for all crossings, frogs and switches.

All crossings should have reinforced running rails, making three rails each way, and so constructed that same can be taken apart at the corners, and each piece should be so marked that the track department will have no trouble in putting same in place. Crossings with angles less than 27 degrees should be made with rigid frogs, that is, two single and two double frogs, or crossover frogs.

Heavy plates should be put under each corner of a crossing—say not less than $\frac{3}{4}$ of an inch thick. One inch thick would be much better, for every wheel that passes over a crossing will give it a jar on the corners. It will help the life of the crossings. Engines and cars are about four times the size they were years ago; hence, great care should be taken in the construction of this material, also in putting them down in the track on a solid foundation, well drained. I have noticed that on some roads there are pools of water at the crossings. With very little expense it could be properly drained, and the life of the crossing would be as long again. The same plan would be good on frogs and switches.

In regard to repairs to frogs, I will state if a frog point is worn down too low at the point, you will find the guard rails worn down on the same place, and the frog comes to you for repair on account of the point being broken, or one of the guard rails is broken. My motto is to scrap the entire frog, as you never

can make a first-class job on a worn-out frog. But if a point should break on a good frog, you can split the point and weld a piece of steel in, and make as good a frog out of it as it ever was.

Table of General Dimensions for Number 6-7-9 and 14 rigid frogs for 80 and 90-pound rails.

Number of Frog	No. 6	No. 7	No. 9	No. 14
Length of frog	9′-10″	10′-0″	12′-0″	18′-0″
From point to heel	5′-9″	6′-6″	7′-9″	11′-10″
From point to toe	3′-3″	3′-6″	4′-3″	6′-2″
Heel spread	0′-11½″	0′-11¼″	0′-10½″	0′10¼″
Toe spread	0′-6½″	0′-6″	0′-5¾″	0′-5¼″
Length of wing rails	7′-1″	8′-1″	9′-3″	12′-5½ & 12′-7
Length of long point	5′-6″	6′-2½″	7′-4½″	11′-3″
Length of short point	4′-6″	5′-0½″	5′-10½″	8′-11″
Length of main filler	3′-0½″	3′-7″	4′-2½″	5′-11½″
Length of heel riser	1′-8″	1′-11″	2′-3″	2′-10″

If one of the guard rails break, you can put another in its place at very little cost. If a switch breaks off at the point, or is worn down, all you can do with it is to make a short point out of a long one.

I do not approve of making a new frog out of old rail, partly worn, as the rails get very hard and crystallized by running over them. If you have to bend the rails you had better heat them, or you will break a good many of them in the bending machine. New rails can be bent cold without breaking, and a good many times new frogs constructed out of second-hand rail will break much quicker in the track than one made out of new rail. In some instances you have to make new frogs out of old rail, on account of new rail being higher than the old.

We purchase all the filling irons the right shape for the different sized rails. All you have to do is to fit them together at the point and drill them. I think iron fillers are much better than steel, as they will not break as readily at the holes.

We use ⅞-inch bolts on 50-pound frogs; 1-inch bolts on 62-pound; on 80-pound, 1⅛-inch bolts, and on 90-pound, 1¼-inch. And we use 6 bolts in No. 6 frog; 7 in No. 7; 8 in No. 9, and 10 in No. 14, with nut locks and lock nuts, so it is next to impossible for the bolts to get loose. They generally hold tight until the frog is worn out. We do not use any clamp frogs on our road at present, although we used them at one time.

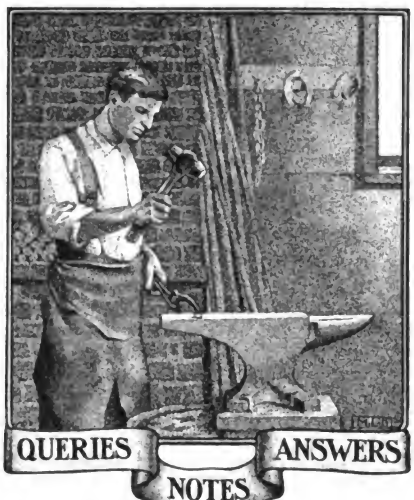
I am giving herewith two tables which I believe will be of interest and value to those of you who are interested in frogs, crossings and switches. The first table gives the general dimensions for our common standard Nos. 6, 7, 9 and 14 rigid frogs for 80 and 90-pound rails. This table gives the length of the frog, the spread, length of wing rails, length of long and short points, length of main filler and length of heel riser. The other table shows the gauge on curves of various degrees.

Table Showing the Gauge on Curves of Various Degrees

DEGREE OF CURVES

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16 or over
Gauge	4′-8½″	4′-8½″	4′-8½″	4′-8½″	4′-8⅝″	4′-8¾″	4′-8¾″	4′-8⅞″	4′-8⅞″	4′-9″	4′-9″	4′-9″	4′-9⅛″	4′-9⅛″	4′-9⅛″	4′-9¼″
Flangeway	1⅞″	1⅞″	1⅞″	1⅞″	1⅞″	1 15/16″	1 15/16″	2″	2″	2 1/16″	2 1/16″	2 1/16″	2 3/16″	2 3/16″	2 3/16″	2¼″

In no case shall gauge be greater than 4′-9¼″



When Asking Questions.

This department is for the use of "Our Folks" in discussing matters of craft interest—for asking and answering questions on craft topics—and we want every one of our big family of readers to make use of these columns whenever and as often as he desires. We want every subscriber to feel that this is his very own paper, and we want everyone to feel free at all times to discuss, to argue and to ask and answer questions.

And in this connection we want to say a word—to make a suggestion, the following of which will assist the editors and contributors very much in replying to the questions asked and in explaining the processes and methods requested.

The suggestion is simply this: Explain fully and carefully when you ask for information. Don't be afraid to take up too much of our space or our time. Both are yours and both are at your disposal. And if a question is worth asking at all it is worth both time and space.

So, explain your queries fully. If you want to know how to cure a foundered horse, tell, if possible, what caused the disease, which foot or feet are affected, and tell every other important point that you have been able to observe. When you want to know how to temper steel, tell what the metal is to be used for—if for an axe, a butcher knife, a chisel, etc. Don't just ask the how and why and wherefore—tell all you can about the case—give us all the information and then you can depend upon it that we will answer you or know the reason why. A question well asked and fully explained is half answered.

And in this connection just a word more about some questions that pass, apparently unanswered. Many of the questions asked in our columns are, in truth, requests for special articles. For instance, when a reader asks how to paint a wagon, an answer is almost impossible immediately. There are so many matters to be considered, so many different sides to painting, that a series of articles is required to answer the question correctly and fully. Then, again, there are those who ask questions on subjects, information upon which has just been published. These querists are, or course, referred to the issue or issues containing the matter they want.

Your coöperation in the above suggestions will assist us greatly in carrying out plans which we will shortly announce which will make the question department still more valuable to "Our Folks."

A Training Bridle Wanted.—I would be glad if some reader could give me an idea of what they consider the best device for a training bridle for a vicious horse or mule.

CHAS. F. SPRADBROW, South Africa.

Questions on Shoeing.—I should like to know how to shoe a square trotter so he will pace and also how to shoe a pacer so he will trot. Should also like to know how

to cut their feet and what weight of shoe to use. G. R. TREADWELL, Maine.

Wants to Make Hard Gloss Paint.—Please tell me how to make a quick drying, hard gloss paint, such as the green on iron pumps, black on hay tools and door hangers and red implement paint.
J. D. BROWN, Ontario.

Wants a Good Wood Filler.—I should like to ask through your paper how to make a first class wood filler for the priming coat of paint, when painting hardwood; such as white oak and hickory. Any information on this point will be gratefully received.
T. W. BARNES, Oklahoma.

Wants to Shoe Knee Knockers.—I have a few young colts three years old who are knee bumpers of the worst kind. What kind of shoes are the best to use on this kind of horse? I am using a very light shoe. Will appreciate any information you can give. W. B. POBST, Maryland.

Another Old Horse.—About a month ago I shod a horse that was 37 years old last Spring, and who is still doing service for its master. In July last, this horse with a man nearly seventy years old worked in a hay field and raked in six acres of hay in a little under three hours. His owner considers this a record, and would now back the horse to trot one mile in five minutes. The owner cannot give the weight of the horse but he is a dark brown and about 15½ hands high. JAMES HUBBARD, England.

Another Puzzler.—I notice in your June issue that it is possible for one of your subscribers to disconnect two pieces of iron one from the other without taking a particle of one attached to the other. He challenges the world. Seeing that he is so clever I would ask him if he can do the following:

If I take him a horse to be shod, can he take the four old shoes off, weld them together and make four new ones with them, put the new ones on the horse and still have the four old shoes in the shop?
STEPHEN COCHRANE, England.

An Australian Shop.—I have found "Our Journal" to be a very fine paper for any blacksmith and it is useful and valuable not only for himself but for the young men working in the shop also.

I have two forges and am now putting in a 4-horse oil engine, a Silver band saw, a circular saw, an emery wheel, a drilling machine and also a power blower. I am doing a trade of over £4,000 (about $19,500) per year. I keep twelve hands employed all the year around. Our principal trade is sulky building, for which vehicles I get from £21 ($102.00) to £24 ($116.00), and am turning out from fifty to sixty per year Then, too, I build all sorts of other vehicles and do a lot of repairing.
W. MISCAMBLE, Queensland.

MR. E. W. SMITH'S SHOEING SHOP, OF NEW JERSEY

Treating Self-Hardening Steel.—I noticed a letter from a smith in South Australia asking for information in regard to tempering self-hardening steel. The following, I believe, will give satisfactory results. Make a good, clean, deep fire, hard coke or anthracite coal is preferable, or if one cannot get either, use coked blacksmiths' coal, but be sure to have the fire clean and deep. Lay the point of tool in the fire, point or cutting edge up. Heat slowly at first to insure uniform heat throughout the metal. When the steel becomes white, apply more blast and heat quickly to a sweating or dripping heat, or a heat resembling a welding heat on iron. Quench in oil—linseed, cottonseed, fish or lard oil.

After the steel becomes white it should not be allowed to touch the fuel, either in heating or removing from the fire.
B. B. MILLER, Supt.
Detroit Steel Treating Co.

A New Jersey Shoeing Shop.—The accompanying engraving shows an interior and also an exterior view of my new shop. The shop is 30 by 25 feet. The lot is 95 feet long. I bought and paid for it the past spring and now have no more rent to pay. My equipment consists of one Champion forge, one Hay-Budden anvil, a Black Diamond improved drilling machine, one Neverslip machine, one set of Little Giant taps and dies, two floor kits and tire shrinker. I also have electric light in the shop. E. W. SMITH, New Jersey.

Several Questions.—We have a 400 Champion hand blower that does not work properly. It takes all a fellow's wind to keep the fire alight. Perhaps we have it set up wrong Could some smith advise me?

What uses can a Bulldozer be put to? Is it a sort of a press? Who manufactures them?

What firm sells good white hickory in planks, and wheels for varnished coach work? We have some difficulty in obtaining genuine white wood, as it is not uniform in color.

Is there any chance of obtaining young hickory plants to plant here in Australia? I don't think they have ever been tried in this country.

Can any smith suggest a template or machine for making fifth wheels such as I have tried to describe, also tools for making harrow teeth? I want to heat them in one heat, if possible.

W. F. KRUMMEL, South Australia.

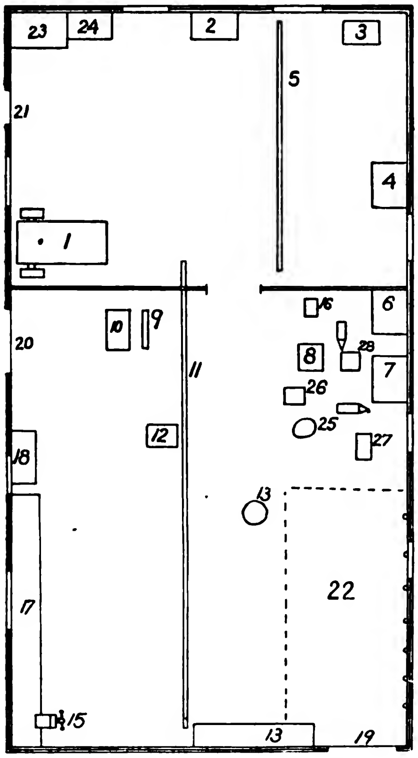
Lubricating Liquid—Emery Wheels.—In reply to Mr. J. D. Brown, Ontario, regarding lubricating liquid, would say he has the name all right. If he had mixed up some strong soap suds, and made use of them, he would not be asking about the use of the white, soapy liquid. This is all there is to the mixture. Shave ½ bar of soap in about two gallons of water and boil till the soap is all dissolved, and then set away to cool. When cold it is ready for use. It is used the same as oil, only more freely.

In reply to Mr. S. Sullivan, Oklahoma, who desires information on how to put emery on an emery wheel, would say that the easiest way is probably this: Melt some glue over a slow fire and spread it on the wheel with a paint brush. Lay your emery on a paper or a clean board and roll the wheel


INTERIOR OF MR. E. W. SMITH'S SHOEING SHOP

in the emery, pressing down on it till it is well coated, then set away to dry. I think this method is a good one and will bring forth good results. The emery can be bought from any wholesale hardware dealer from whom Mr. Sullivan may buy his stock.

C. W. METCALF, Iowa.



THE FLOOR PLAN OF MR. WM. LEISHING'S SHOP

Several Questions.—Will some one please answer the following questions? 1. Will paint prevent iron and steel from welding? 2. Is the wrought steel used for pole irons the same as mild steel? 3. How can wheels be prevented from dishing? 4. How much draw should the tire on the different sized and conditioned wheels have, respectively? 5. Is sulphur or anything else that would prevent welding ever contained in carriage paint? 6. Does blacksmith coal sometimes contain sulphur or anything that would make trouble in welding? 7. Does sand, when used as a welding flux on iron or steel, make the metal hard or brittle? 8. Would like complete and detailed instructions for setting tires.

I had an experience recently which caused me to think of some of the above questions. I had a hammer strap to weld. It was broken adjacent to the double tree bolt hole. I tried to heat, a piece (iron I think it was) on. It refused to weld until, I think, the third heat when I finally welded it, but it was burned or hammered too small next to the weld, so I cut it off and tried a new place, this time putting on a piece of new, mild steel with similar results. I used sand on the heat this time that stuck. I had used borax before. I thought I had conquered, this time, but when I had it nearly on the pole I found that the steel which I had welded on was broken nearly off, about one fourth of an inch from the end of the weld and presented a crystalline appearance similar to a broken file. Was it burned? I tried different heats on these pieces. Even when they seemed covered with a fluid which I could see running, and which would bubble and fry, when hammered it would not stick, but acted as if the fluid were water. At first I thought it was the paint on the hammer strap, but now I think it must have been the coal. Any information along this line will be appreciated. Is there any place to which I could send these pieces I cut off for examination.

S. E. FRAZELL, Nebraska.

An Oklahoma General Shop.—The accompanying engravings show an exterior view of my shop, also the floor plan, which will give you an idea of my equipment. I do a general smithing business.

1. 12 H. P. Gas Engine, 2. Bolter, 3. Stone Burr, 4. Sheller, 5. Mill Line Shaft, 6. Forge, 7. Forge, 8. Trip Hammer, 9. Counter Shaft, 10. Emery Stand, 11. Main Shaft, 12. Drill Press, 13. Wheel Bench, 14. Bolt Rack, 15. Wood Vise, 16. Blacksmith Vise, 17. Wood Bench, 18. Cold Tire Setter, 19. Double Door, 20. Double Door, 21. Mill Door, 22. Shoeing Floor, 23. Desk, 24, Safe, 25. Mandrill, 26. Swage Block, 27. Hot Tire Shrinker, 28. Leveling Block.

WILLIAM LEISHING, Oklahoma.

More on Cold Tire Setting.—It has been suggested that the manufacturers of cold tire setters give competitive demonstrations of their machines at various places throughout the United States. Such demonstrations to be on actual work, i. e., upsetting and tightening tires by the cold process on all sizes and conditions of wheels as brought to the repair shops. This would be a great means of educating the blacksmiths in cold tire setting and in teaching them how to operate the machines to get the best of results and decide as to which make of machines was best adapted for the work in their particular vicinity. It would also be a very effective way of advertising the cold process and selling their machines.

The writer has read with interest the experiences of various smiths, and the majority of the "trouble-cases" are due to the smith's first owning a certain cold tire setter that time has proved to be a failure, due to its imperfect mechanical construction, which was not in evidence until the machine had been used on wheels of various conditions and sizes as they came to the shop for repairs.

Their experiences are only those of many other blacksmiths, for many experimental machines have been built, sold and paid for. Some built by people who are out of the business today. There are others who are still in the business and building machines today that are not practical and are bound to go off the market sooner or later. These machines are being sold to the blacksmiths, but they will finally result in a loss to the smith. Such machines have been and are at present being sold, not on the reputation of the machines themselves, but on the reputation of cold tire setting, as established through the practical machines which have demonstrated the success of the cold process.

The writer believes that the blacksmith, as well as the public or vehicle-owner, should have some protection against improperly constructed machines, and competitive contests would soon weed out such machines.

A number of competitive contests and exhibits could be arranged between the manufacturers and given at different places in the United States—each competing company to give $500.00 or $1,000.00 as an advertising fund, and this advertising fund used in inviting the blacksmiths to the exhibits and in paying the blacksmiths' railroad fares to and from the contesting exhibit. It would be a very effective way to promote the cold process of setting tires, and it would be a great source of education for the blacksmiths in a process that will do more to build up his business, make his income from tire setting almost all profit and give him more time for other work than anything else that is applicable to his trade.

Now, let us look at the selling side. The manufacturer pays out a liberal amount to sell his machine. He pays his traveling salesmen's salaries and expenses. If he is selling through hardware firms or dealers, the price of the machine is made high enough to the blacksmith so the manufacturer can give the dealer a discount large enough to take care of the dealer's traveling salesmen's salaries and traveling expenses, and pay the dealer a liberal profit beside. To sell his machines in this way costs the manufacturer more than it does to sell direct through his own salesmen, but the manufacturer who places his machine through the hardware dealer wants the dealer's prestige and influence, and this is the only way he can get it. The hardwareman or dealer makes the manufacturer pay for his (the dealer's) influence, and the blacksmith pays the entire bill.

Now, why not give the smith some of this money, and at the same time give him a chance to see the different makes of cold tire setters in operation side by side? The blacksmith could make his choice knowingly, and the manufacturer's sales made in this way I dare say would cost him less.

The writer does not mean that the manufacturer should stop selling his machine through the heavy hardware dealer or through their own traveling salesmen, but by this plan the manufacturers would increase their business at a less cost and would protect the blacksmith against impractical

THE GENERAL SHOP OF MR. WM. LEISHING OF OKLAHOMA

machines. It would also rapidly promote the cold process and educate the blacksmiths in cold tire setting.

The writer would be pleased to hear from the blacksmiths on this subject and to know whether such an exhibit and contest meets their approval and whether or not they would attend one if it were within a reasonable distance of their own town.

E. A. REBHAN.

Standard Price List Adopted by Fannin County Branch of the American Association of Blacksmiths and Horseshoers, at Bonham, Texas, July 15, 1910.

HORSESHOEING.

No. 0-1-2-3, plain........ $1.25
No. 4, plain........ 1.35
No. 5-6, plain........ 1.50
Resetting, plain........ .80
Toed shoes, extra, each........ 12½

WAGON WORKS.

Fill, rim and set tire, sec. growth oak spokes, oak rim (4)........ $20.20
The same, with 3X select spokes........ 18.00
½ set (2 wheels), sec. growth spokes 10.25
½ set (2 wheels), 3X select spokes.. 9.25
1 wheel, sec. growth spokes........ 5.15
1 wheel, 3X select spokes........ 4.60
Filling wheels (4), 3X select spokes 12.00
Filling wheels (4), sec. growth spokes 14.30
Rim'g and set'g tire, oak (4 wheels) 9.00
Rim'g and set'g tire, Bois d'arc (4 ") 15.00
Fill'g and sett'g tire, Bois d'arc (4 ") 22.80
New wheels (4), 3X select oak spokes, oak rim, new oak hubs, old tire and boxing set........ 30.25
New wheels (4), sec. growth oak spokes, new oak hubs, Bois d'arc rim, old tire and boxing set........ 38.25
New set Bois d'arc wheels, complete 50.00
The above price is for 3-in. and 3½-in. wheels.
New set oak hubs, banded (setting boxing extra)........ 6.25
New wagon axle, 3-in. & 3½-in., hind 3.25
New wagon axle, 3-in. & 3½-in., front 3.50
Bolsters, rocking and hind.... each 2.00
Bolsters, sand........ " 1.50
Bolsters, stakes (old irons)........ " .50
Setting boxing in new hubs........ " .50
Setting boxing in old hubs........ " .25
Setting skeins........ " .50
Wagon reaches, 10 ft. & 12 ft., fin. " 1.25
Wagon reaches, 10 ft. & 12 ft., rgh. " .75
Wagon tongues, oak or ash.... $2.50 and up
Wagon hounds, hind, each 1.25 per set $2.50
Wagon hounds, front, straight, each $1.25, per set........ 2.50
Wagon hounds, front, bent, each 1.75 per set........ 3.50
Wagon hounds, tongue, each 1.00.. 2.00
Wagon brake-beam, oak or ash 1.00 to 1.50
Wagon box, 14-in. bottom, 12-in. top, 10 ft. 6 in. long (pine)........ 20.00
Dray bed, per lineal ft., 12-in. or 14-in. top, $1.25, 24-in. or 28-in... 1.50
New bottom in wagon box........ 3.50
New wagon box sleepers,........ each .50
New wagon box, end gates, plain 1.00 folding........ 1.50
New wagon box, side panel.... $3.00 & up
Wagon doubletree, old irons........ 1.00
Wagon singletree, old irons........ .75
Wagon neckyokes, old irons.. .75 to 1.00
Wagon spring seats (wood)........ 2.50
Painting on above work to be 1 coat and priming.

WAGON IRON WORK.

New bolster end irons........ each $ .30
New bolster stake irons........ " .50
New sand bolster plate put on... " 1.25
New rocking bolster plate........ " .50
4 wagon tire set, hot........ 2.25
4 wagon tire set, cold........ 2.00
Rub irons........ each .50
Hind hound plate........ " 1.00
Hind hound braces........ " .50
Hammer strap........ each $ .35
Tongue cap........ " .50
Tongue rod, ½ in. & 9/16-in., $.40; ⅝-in. .50
Tongue plate........ .25
Wagon wrench........ .50
Hub bands, old $.15 each, new, each .25
King bolt........ " .50
Box strap bolt, put on........ " .25
Seat springs........ " .75
4 3 or 3½-in. skeins & box'g put on 8.00
One new skein, $2.00; one new box'g 1.00
Top iron on bottom box........ 1.00
Box rods........ each .25
Center clip on singletree........ " .20
End clip on singletree........ " .15
Neckyoke, center irons........ " .50
Neckyoke, ferrules........ " .15
Seat Hooks........ per set .60
Staples for dray bed........ each .15
Clips for dray bed, 7/16 iron........ " .25
Brake shoes........ " .50
New gear brake........ 5.50
Brake Ratchet, complete, wrought.. 2.50
Rub irons for dray bed (not put on) per pair .75

BUGGY IRON WORK.

Buggy stubs put on, up to & incl. 1 in. $8.00
Buggy stubs, one only........ 2.50
Axle set, hind $1.00, front........ 1.25
4 buggy tires set hot $3.00; set cold 2.50
Welding spring, per leaf........ 1.00
Welding shaft iron & replacing, each .75
Shaft shackles........ " .50
Shaft eyes........ " .50
Pole brace, welded........ " .50
Pole eye........ " .50
New T-hammer strap........ " .65
Axle clip........ .20
Saddle clip........ .25
Steel bow socket........ $.75 to 1.00
Buggy singletree clevis........ each .35
Buggy singletree, ferrules........ " .10
Buggy singletree, T-bolt........ " .10
Buggy singletree, cock eye........ " .10
Buggy clip kingbolt........ " 1.00
Buggy reach iron welded on old reach .50
Buggy top, prop iron (new)........ .20
Buggy top, prop nut (new)........ .15
Buggy bow socket rivet (new)........ .10
Buggy spring (new)........ $2.50 to 3.00
Buggy spring clip........ each .35
Buggy shackle clip........ " .50
Buggy shaft sockets........ " 1.00
Welding buggy axle, hind $1.00; front 1.25
New fifth wheel put in........ $2.50 & up

BUGGY WOODWORK.

Shafts, old iron, each........ $1.50 to $1.75
Shafts, odd and special—prices on applicat'n
Shafts, ironed and painted, complete, set........ $3.50 to $4.50
Shafts, cross bars, old irons........ 1.00
Pole, only........ each 3.00
Pole circle, only........ " 1.00
Pole, ironed and painted, complete (no neckyokes)........ each 7.00
Buggy singletrees........ each $.50 to 1.00
Buggy doubletrees........ each 1.00
Buggy neckyokes........ each $1.00 to 1.25
Buggy spokes, 1 only " .25
Buggy rims per set, ⅞ & 1 in. (tire ex.) 5.00
Buggy rims, per piece........ .75
Buggy rims, over 1 in........ 6.00
Buggy axle cap........ $1.00 to 2.00
Buggy reach, single, straight, up to 1½ in........ each 1.25
Buggy reach, single, bent, up to 1½ in. .... each 1.50
Buggy reach, double, straight, ⅞ & 1 in. 1.00
Buggy reach, double, bent, ⅞ & 1 in... 1.25
Buggy reach, specials, extra—application.
Buggy head block, plain 1.00; scrol'd 1.25
Buggy spring bar, plain, $.75 to 1.00 " 1.25
Buggy side bar........ each 1.00 to 3.00
Buggy body, side panel (poplar)........ 3.00
Buggy body, end panel (poplar)........ 1.50
Piano buggy box, old irons........ 12.00
Spring wagon box........ 14.00
Buggy and surrey dashes, each 1.50 to 3.50
Buggy boots........ each 1.00 to 2.00
Wood buggy bows in top, each 1.50 to $1.75
New wheel, complete, C grade, ⅞ in. & 1 in........ 5.00
4 new wheels, complete, C grade, ⅞ in. & 1 in........ 15.00
4 new wheels, complete, C grade 1⅛ in. 16.50
4 new wheels, complete, C grade, 1¼ in. 18.00
Filling Sarven wheel up to & incl. 1¼ 4.00
One new side in buggy seat $ .75 and up
One new back in buggy seat.. 1.25 and up
One new piece in seat frame........ .75
One new seat post........ .50
One new corner post........ $.50 to .75
Setting box in new wheel .50, old wheel........ each .25

PLOW WORK.

Setting plow beam........ each $ .50
Plow rounds........ each $.10 to .25
Plow handles, straight.... each .40 and up
Plow handles, bent........ each .50 and up
Cultivator handles........ each .50
Cultivator singletree........ .35
New landside plate, 9 & 10 in........ 1.00
New landside plate, 12 & 14 in.... 1.25
New landside bar and frog........ 2.00
New Cross Clevis........ .35
Plow evener wood........ .50
Plow singletree........ $.35 to .50
Sharpen disc harrow, per disc........ .25
Four-horse evener........ 1.50
Sharpening harrow teeth........ each .02
Sharpening road grader blade " 1.50
Making new plow point, 9 in... " 2.50
Making new plow point, 10 in.. " 2.75
Making new plow point, 12 & 14 in. each 3.50
Making new burster point, 12 & 14 in. .... each 3.50
Point and sharpen pts., 9 & 10 in. " .75
Point and sharpen pts., 12 & 14 in. " 1.00
Point and sharpen pts., 16 in. " 1.25
Point and sharpen burster points, 12 & 14 in........ each 1.00
Point and sharpen burster points, 16 in........ each 1.25
Point cultivator shovels,... per set 2.00
Sharpen burster point, 12 & 14 in, each .25
Sharpen plow shares, 9 & 10 in. " .15
Sharpen plow shares, 12 in. $.20; 14 & 16 in........ each .25
Sharpen cultivator shovels, per set.. .50
Sharpen sweeps, 8, 10 & 12 in. each .12½
Sharpen sweeps, 14 & 16 in. " .15
Sharpen sweeps, 18, 20 & 22 in. " .20
Sharpen sweeps, 24, 26 & 30 in. " .30
Sharpen sweeps, 36 in........ " .40
Sharpen stalk cutter blades, where you don't have to take off and replace, 1 edge $ .20; 2 edges... .35
Set cultivator foot........ each .25
Set cultivator beam........ " .50
Weld and set cultivator evener " .50
Cultivator tongue, oak and ash " 2.50
Cultivator tongue, pine........ " 2.25
New plow bolts........ " .05
New bolts put in, any kind,.... .... each $.05 to .10

MOWER AND BINDER WORK.

Weld sickle bar........ each $ .50
Weld new piece on sickle bar, each .... $.75 to 1.00
Weld binder sickle........ .75
Weld new piece on binder sickle........ 1.00
Weld pitman........ .50
Weld hook on pitman........ .50
Putting straps on wooden pitman (work) .25
Putting sections on sickle bar........ 1.00
Putting plates on........ $1.00 & up
New mower and binder tongues (pine) 3.50
New wooden pitman........ $.75 to 1.00
Odd work, per hour (stock extra).. .50

ODD JOBS.

Bridge bolts, rods and chains, per lb. $ .10
Sharpening well drill........ $1.00 to 2.50
Water tanks (wood), 16 & 18 in. deep, per lineal ft........ 2.00
Special bolts under 12 in. long and under, ¾ in. diameter, each $.10 to .50

VOLUME 10

THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y. U.S.A.

DECEMBER, 1910

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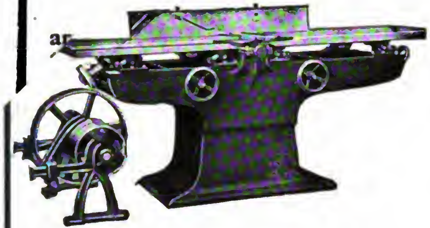

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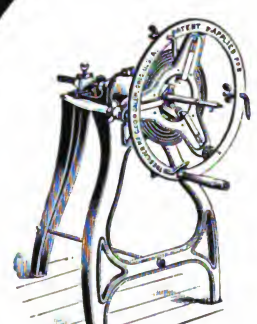
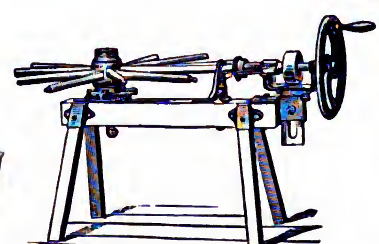


Fig. 709.
SILVER'S NEW TAPER HUB BORING MACHINE
with self-centering hub-chuck and quick acting open feed nut. Two sizes.



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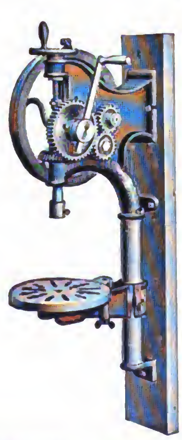

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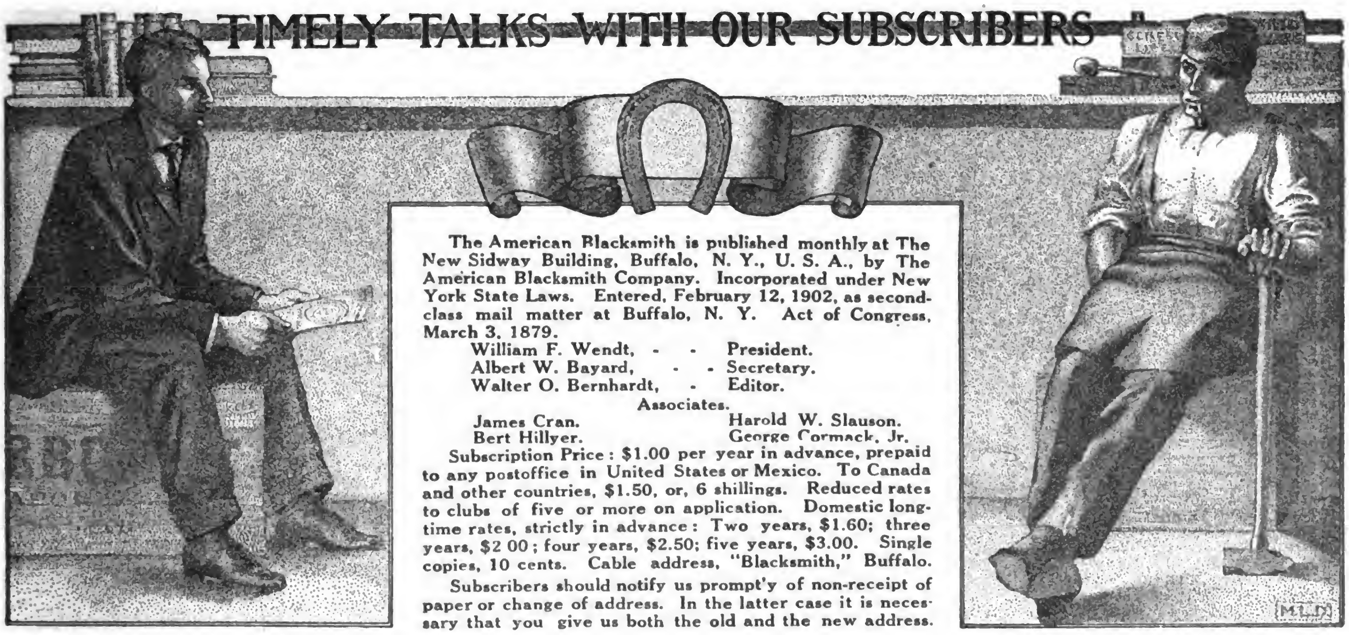

The American Blacksmith is published monthly at The New Sidway Building, Buffalo, N. Y., U. S. A., by The American Blacksmith Company. Incorporated under New York State Laws. Entered, February 12, 1902, as second-class mail matter at Buffalo, N. Y. Act of Congress, March 3, 1879.

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Albert W. Bayard, - - Secretary.
Walter O. Bernhardt, - Editor.

Associates.

James Cran. Harold W. Slauson.
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Subscription Price: $1.00 per year in advance, prepaid to any postoffice in United States or Mexico. To Canada and other countries, $1.50, or, 6 shillings. Reduced rates to clubs of five or more on application. Domestic long-time rates, strictly in advance: Two years, $1.60; three years, $2.00; four years, $2.50; five years, $3.00. Single copies, 10 cents. Cable address, "Blacksmith," Buffalo.

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1911

At this, the dawn of the new year, we want each one of "Our Folks" to resolve to send in at least one item for publication during the coming year. We want to make 1911 just the very biggest and best year of THE AMERICAN BLACKSMITH. And to do so we must have the help of our big family of readers. Will you coöperate with us in making a bigger and better paper in 1911? We can do it, but not without your help.

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annual program and at the ... help pay the cost of printing.

The American Blacksmith, published monthly in Buffalo, N. Y., by the American Blacksmith Company, is a 50-page magazine that no member of the craft can afford to do without. It costs but $1.00 per year, and every number is worth the yearly subscription. This is not an advertisement, but merely the honest opinion of the Montana readers due the excellent and worthy publication in the interests of every blacksmith in the land. Read one copy and you will subscribe for it.

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The above notice was published without our solicitation in the program of the Fifth Annual Montana State Convention of Master Horseshoers' Protective Association. Not one penny was paid for it—not one request made for it. It is the unasked-for, "honest opinion of Montana readers" of THE AMERICAN BLACKSMITH. It means a lot when readers of a paper freely publish their opinions—when they say "every number is worth the yearly subscription." It means that the paper is doing its work right—giving readers what they want when they want it, and looking after their interests first, last and always. Tell your neighbor.

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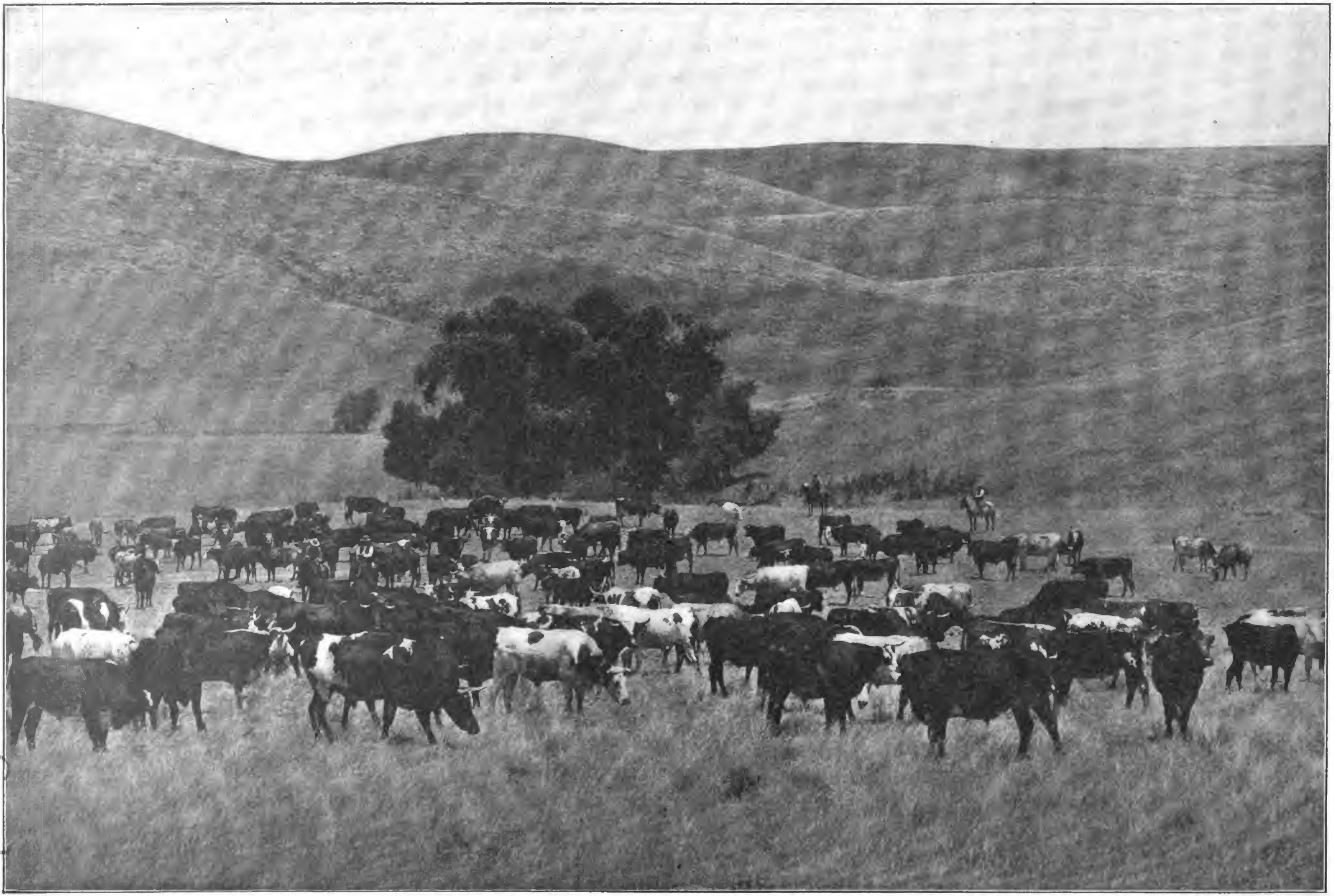
And you can get it Free—See Page 29 of November for a full explanation of our plan.



SCENE ON A WESTERN RANCH, WHERE CATTLE ARE RAISED BY THE THOUSANDS

Hardening and Tempering Steel

With Electricity

W. O. B.

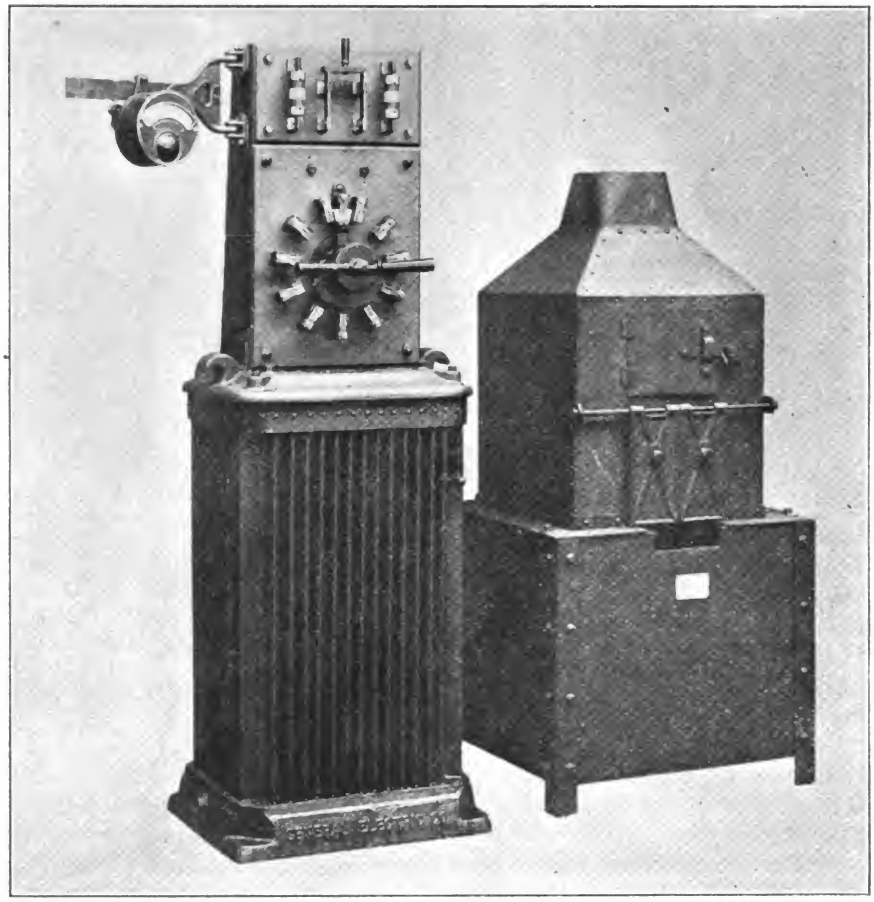
TODAY we find electricity doing many things, from the ringing of a doorbell to the propelling of trains at lightning speed. And by no means the least among its many and various uses is its application in the hardening and tempering of steel. In this field its performance is quite as wonderful as in some of its other work.

The outfit for hardening and tempering steel by electricity, as furnished by the General Electric Company, consists of a furnace with a suspended hood, the regulating transformer, with its controller or regulator, a switch and an ammeter. The controller is provided with a sufficient number of contacts to insure a fine adjustment of the current, and it is possible to obtain, with suitable salt mixtures, bath temperatures from 250° to 1350° C. The current can be easily adjusted to any strength and maintained constantly, and it is, therefore, apparent that the temperature of the furnace is under easy control and can be kept at any desired degree with equal facility.

The furnace, itself, as shown in the illustration, consists of a crucible imbedded in a thick layer of asbestos, which, in turn, is surrounded by a thick wall of fire clay. These are all held together by an iron case or jacket. Two electrodes of very soft, low-carbon iron are used to conduct the current through the bath and are located on opposite sides of the crucible. They are wholly immersed in the bath.

The method of insulating and retaining the heat in the furnace is such as to allow the exterior of the furnace to become scarcely hot after running all day.

The bath for hardening and tempering, fills the crucible within a short distance of the top, and usually consists of properly proportioned parts of barium chloride and potassium chloride, the proportion of each depending upon the material to be hardened. For ordinary steel, the makers of this furnace recommend a bath of fifty per cent barium chloride to fifty per cent potassium chloride, the percentage of each being varied if the operating temperature of the bath is to be changed. The more barium chloride that is used, the higher the temperature, and the more potassium chloride, the lower the temperature. For good tool steel, a temperature of 725° to 825° C. is required.



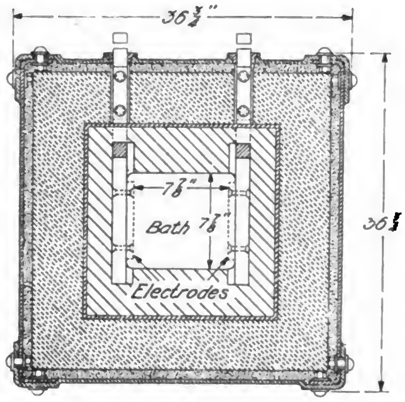
Courtesy General Electric Co.

A 25-KILOWATT ELECTRIC HARDENING FURNACE OUTFIT

For high-speed steel, where a very high temperature is required (about 1225° C.), the bath should consist of chemically pure barium chloride only. For tempering below 700° C., pure sodium nitrate is used, and sometimes a mixture of sodium nitrate with potassium nitrate.

In operation, the crucible is filled with the proper salt or mixture of salts. Then a small piece of carbon is pressed tightly against one of the electrodes by an auxiliary electrode, as shown in Fig. 3. This causes the carbon to become incandescent and to melt a channel in the surface of the salts. The current which passes through this conducting channel melts the surrounding salts and allows more current to pass, and thus, in a short time, the entire mass of salts is completely melted.

When the salts have reached their proper temperature, that part of the work to be hardened is immersed in the bath and allowed to remain until it is of the same color as the bath, when it is removed and quenched in either oil or water. The bath being of the proper temperature, and that temperature

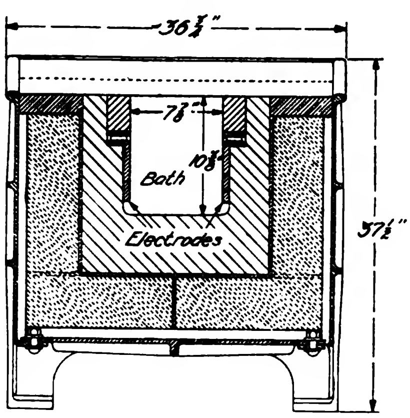


Courtesy General Electric Co.

FIG. 1—SECTIONAL VIEW OF ELECTRIC FURNACE

being constant, there is no possibility of overheating work. Tools may be placed in the bath and kept there indefinitely without overheating or burning. In a demonstration of this furnace, witnessed by the writer, a chisel was dropped to the bottom of the bath and left there for four hours. When broken, after quenching, the grain of the steel was perfect, there was no sign of overheating, and the tool was apparently as well hardened as though it had been heated in the proper manner.

By the method of heating explained, no oxidation can occur, for the material is never in contact with air while heating and, even when removed from the bath, a film of barium chloride adheres to the surface of the tool and protects it from oxidation until quenched. The material after heating is thus kept bright and clean, facilitating the observation of the tempering colors and obviating the necessity for cleaning or polishing the tempered articles after leaving the cooling bath. This method of heating possesses the further advantage that all parts are subject to the same temperature during the whole process. Projections cannot be melted down or burnt before the interior of the piece has reached the proper temperature, for it cannot get hotter than the bath, and the bath is of just the correct temperature for the work in hand.

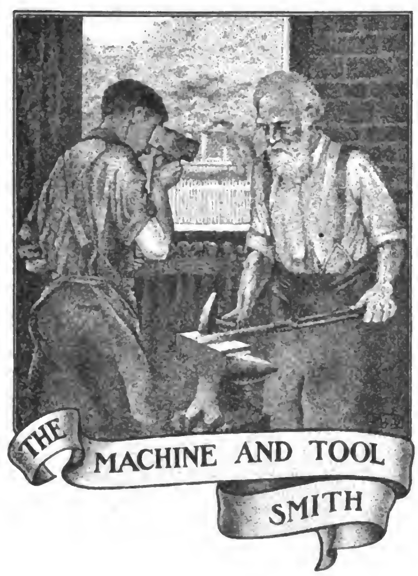


Courtesy General Electric Co.

FIG. 2—SECTIONAL VIEW THROUGH CENTER OF FURNACE

The electric furnace operates most successfully from a single-phase alternating circuit. It is not desirable to use the furnace on direct current circuits, due to electrolysis, which then takes place, and which causes the electrodes to deteriorate rapidly. The direct current also, because of its electrolytic effect, liberates dangerous chlorine fumes which are very injurious to the operator.

In starting the electric furnace it should be said that a considerably higher voltage is required than while running, after the salts have been melted. For example, while it may require 60 or 70 volts to melt the salts, the voltage does not usually exceed 25 while running. The voltage while running continuously depends, of course, upon the temperature desired, the tools and the steel.



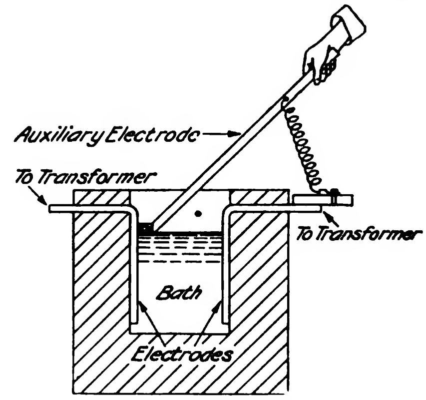
The Treatment of High-Speed Steel.

L. J. BRUNNER.

In the shops of the present day, high-speed steel is one of the most important factors, and I think it is safe to say it is still in its infancy. It has not yet been developed to its highest efficiency.

The present is an era of progress, and every effort is being expended to obtain the maximum output at a minimum cost. For the expensive high-speed equipment of the modern railway shop it is necessary to provide the most efficient cutting tools that skill can produce in order to obtain the best results of which these machines are capable.

The treatment of high-speed steel is a timely subject, and its importance cannot be too strongly impressed upon the foreman blacksmith, the tool dresser and the tool room foreman. The secret of the successful treatment of high-



Courtesy General Electric Co.

FIG. 3—METHOD OF STARTING THE FURNACE

speed steel is—extreme care in heating, both when forging and hardening.

The trouble with a great many tool dressers (especially those of the old school) is that they do not heat the steel hot enough. When we consider for a moment we realize the fact that before the introduction of high-speed steel it was customary for a foreman, when giving a blacksmith a piece of tool steel to work, to caution him about getting it too hot. It is now up to the foreman, if he has a tool dresser following the old teachings, to school him into the new method of treatment.

To get the best results the manufacturers of high-speed steel furnish instructions for the proper treatment of their particular brand of steel, and they all advise about the same thing. Our method is to follow as closely as possible the rules given by the various makers, and we obtain very satisfactory results.

For forging we heat slowly through and through to a good yellow heat and forge till the tool reaches a cherry color, then reheat and continue in the same manner until the tool is finished, when it is laid in a dry place until cold. It is then ground to shape and is ready for hardening. In all heating it is essential to maintain a good bed of fire between the steel and the blast pipe to prevent the blast from reaching the steel. Extreme care should be exercised in hardening, and only the cutting edge should be heated to a good, white heat, but not so hot that the point will fuse. When the proper heat is reached, the tool should be removed from the fire as quickly as possible and immersed in oil, which should be placed as near the

fire as convenient. The tool must be kept in constant motion while in the oil, remaining there until it becomes black, and then removed from the oil to the air blast, which should be allowed to blow onto the cutting edge until cold. If the foregoing rule is strictly adhered to, good results will be obtained, but if, through carelessness or oversight, this method is not followed, serious trouble is sometimes experienced.

It sometimes happens that a tool dresser will get a little careless and try to rush a tool of this kind. He may get it to the proper heat, but heat it too rapidly, with the result that it will develop cracks after it is hardened, and if these cracks are slight they may not be noticed and the tool put in service. If such a thing should happen with a large tool, say 3 x 1½ inches, such as is used on a large tire or wheel lathe, it might cause a serious breakdown to the lathe, by reason of the point breaking off and getting wedged between the tire and body of the tool, which would entail a considerable expense and put the machine out of commission. I had a case such as this a short time ago with a new tool dresser. He is a good man, but at that time had had very little experience with large high-speed tools. He got in a hurry and heated the steel too fast, with the result that the tool developed cracks which, fortunately, were discovered before any damage was done to the lathe. After calling his attention to his mistake he changed his methods and we are now getting perfect tools.

The blacksmith should be made to realize that it is an expensive operation to cut off the point of a large tool before it is worn down to the limit. When we consider the high cost of steel in connection with the extra amount of labor involved to redress a tool unnecessarily, we can readily see that when put in the hands of a careless man a lot of valuable time and material is wasted.

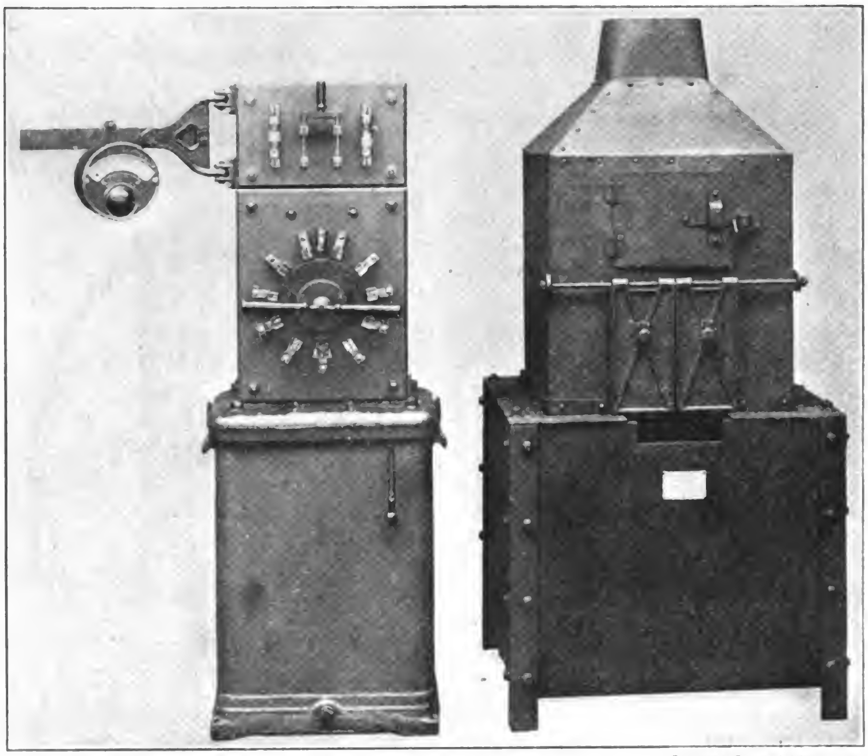
Most all of us know that when a tool is put into service and it does not stand up as it should the blame is immediately placed on the blacksmith, when, as a matter of fact, it is often ruined by the man who grinds it. I have seen instances where tools were properly forged and hardened, but were spoiled by the machinist, through grinding them on a dry, glazed emery wheel and dipping them in water whenever they became hot from the friction of the wheel. High-speed steel will not stand up under such treatment as this.

Our system of working up this steel practically eliminates all waste, as all our large wheel and tire lathe tools that become too short for service are drawn down for smaller tools to be used on other machines, and when these are worn out they are drawn down to ¾ inch and ½ inch square for use in tool holders. This method reduces the waste to a minimum and is quite a factor in the economical use of this valuable material. For this work we have a home-made oil furnace that gives first-rate satisfaction, and we consider it a valuable tool to have in connection with our tool fires. It has an opening 6 inches square and is 12 inches deep. We heat three or four pieces at a time, thus getting a good, uniform heat all through. It will heat the pieces as fast as a man can draw them down, and is very convenient for heating carbon steel tools for hardening and other purposes.

All our high-speed steel is purchased in annealed bars and, therefore, we have very little annealing to do. Occasionally, when we have a piece to anneal, we heat some large pieces of scrap iron in the furnace and put them in an iron box filled with lime, that we have especially for this purpose. These pieces are put in the bottom of the box, and the pieces which are to be annealed are heated at the same time to a cherry red and are placed on top of the heated scrap pieces. The whole mass is then packed with several inches of lime, and the cover placed on the box. This is then allowed to stand until the steel is perfectly cold. There are several other methods of annealing that are equally good, but we have adopted this one on account of its simplicity, and have obtained very good results.

J. B. HASSETT.

I feel that I cannot add much to what has already been said on this subject, for, in my experience, if the instructions issued by the manufacturers for the treatment of their steel are followed, and care taken in heating, forging, grinding and hardening of the tools made from first-class steel, good results are sure to follow.



Courtesy General Electric Co.

A 12½-KILOWATT ELECTRIC HARDENING FURNACE OUTFIT

In our shops at Susquehanna we use high-speed steel with good results and have very little waste, for when a tool becomes too short for one class of machines we forge it down to the next class, and so on down to our smallest size. We have had no trouble in annealing this steel. If we have a number of pieces to anneal we pack them in a casehardening box, in powdered charcoal, and place the box in the casehardening furnace at the same time that we put in a box for casehardening. Both boxes are brought to the same degree of heat; then we remove our casehardening box and let the annealing box remain in the furnace to cool off. If we have only a few pieces to anneal we heat them, as above stated, on top of a

piece of hot iron and cover them with powdered charcoal or air-slaked lime. If the pieces are very large we place another piece of hot iron on top of them before covering, so as to retain the heat for a longer period. Steel annealed in this way can be machined to any desired shape.

For hardening, we use both compressed air and oil. In my opinion the best results for most tools are obtained from the use of compressed air, while for such tools as twist drills, reamers and the like, which require the drawing of temper after hardening, oil is probably the best.

Plain Machine Work for the Blacksmith—8.

GEORGE CORMACK, JR.

The Lathe.

Of all the many and varied machines and tools used in the working of metals, the lathe undoubtedly holds the pre-eminent position. This pre-eminence is due not only to the rapidity and facility with which it can perform certain classes of work, but also because of the variety of its operations. In the general operations of the lathe, drilling, boring, reaming and other processes corresponding to those performed by drilling machines are readily performed, while many operations usually performed by the planer and similar machines may be so efficiently executed by the lathe that it often becomes a matter of consideration, whether the lathe or the planer is the best machine to use for the purpose. The name "lathe" is rather peculiar, as it does not suggest in the slightest degree any of the uses of the machine. It is different from names such as planer, shaper, milling machine, drill press, etc., all of which to a certain degree suggest the operations which they perform. A search for the origin of the name "lathe" leads us far back into primitive history. In order to satisfy those of my readers who may have exercised their minds at some time or other in trying to find a reason for calling a turning machine a lathe I have made a sketch of a lathe in its most primitive form. Such a lathe is shown in Fig. 1, and, furthermore, such lathes are used today amongst primitive people. Some years ago, at the Vienna Exhibition, there were shown wood, glasses, bottles, vases, etc., made by the Hucules, the remnant of an old Asiatic nation, which had settled in the remotest parts of Galicia, in the dense forests of the Carpathian Mountains, and who at all times were famed for their turned woodwork. The picture shows the kind of lathe used by these people from time immemorial up to the present day, and it is evident that it could not be more primitive.

It is obvious that a piece to be turned in such a lathe would be rotated half the time in one direction and half the time in the reverse direction, and that in consequence cutting could only be performed during the times it was rotating in one direction. In fact, the action would more resemble that of the planer than that of the lathe, as we know it. But you doubtless will say, "What has all this to do with the name 'lathe?'" Not very much, but we find that in modifications of this ancient turning machine a wooden spring or lath was used instead of the sapling shown in Fig. 1, and it is from the use of this lath, used for many centuries in Europe, that the name "lathe" had

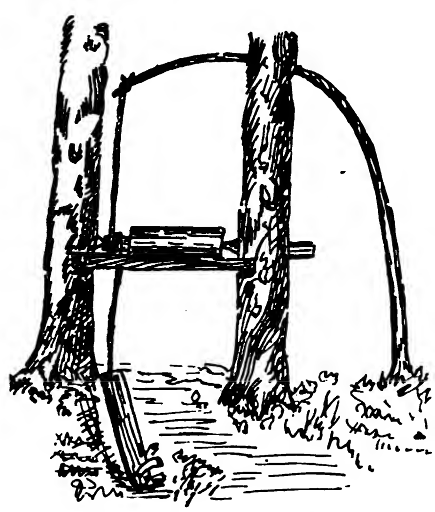


FIG. 1—AN ANCIENT LATHE

its origin. Small jewelers' lathes, operated in much the same manner, would not be hard to find in Europe today, and less than twenty years ago I have seen such lathes in Scotland, where the cord used was a horsehair. I well remember watching an old jeweler, or rather watchmaker, turn up a small shaft for a watch in such a lathe, the stock he used being an annealed common sewing needle. A hand tool was used, held in the right hand whilst the horsehair was pulled with his left hand to rotate the work, a wooden spring being used to rotate it in the reverse direction. It is not my intention, however, to weary my readers with an historic account of the development of the lathe, however interesting such an account might be. We do not have to use such lathes, luckily, and there is enough of interesting operations which can be performed on the lathes we do have to keep us busy studying them for some time to come. I am not going to go into a description of the lathe, as we now have it, but will assume that my readers are familiar in some degree with the ordinary lathe used in turning metals, either foot or power driven. It is also assumed that in the meantime the lathes under consideration are equipped with a tool carriage or slide-rest, having power feed along the lathe, the matter of cross power feed being of minor importance. My principal efforts will be directed to the description of many of the ordinary operations performed on the lathe. How to put the lathe in proper shape to insure good work, and how to manipulate it to do the work accurately and quickly. In other words, as far as lies in my power to impart to my readers the things which it is necessary to know in order to do good lathe work. Outside of the cutting tools commonly known as lathe tools there are several tools which are absolutely necessary in doing lathe work, no matter how simple the work may be. The tools which it is necessary to buy are not expensive, however, and my advice to anyone in buying any kind of tools, if you have any use for tools at all, is to buy the best, and then to take good care of them after you have got them. Good tools will last a lifetime.

First amongst the tools necessary are outside and inside calipers. Two of each kind should be bought. For large work, 12-inch calipers of the common variety, those which are adjusted by tapping are all right. For small work, a pair each of what are known as spring calipers should be procured. These are adjusted by means of a screw and knurled nut, and can, therefore, be brought to a fine adjustment much quicker than the other kind. A handy size is 5 or 6-inch spring calipers. A good 6 or 12-inch machinist's scale is indespensable. One corner of this scale should be divided into eighths, one corner into sixteenths, one into thirty-seconds and one into sixty-fourths. A scale so graduated is universally known as having No. 4 graduation, and if you order such a scale it is enough to give the length, and then to say: "No. 4 graduation." Also specify a spring tempered scale. It will cost only a few cents more and will never get marred up as a soft steel scale will. Another tool, not so well known outside of the regular machine shop, but of no less importance, is the thread and center gauge, shown in Fig. 2. This gauge is used in grinding and setting tools for cutting V and U. S. Standard threads,

and also when grinding or turning up the lathe centers. The V-notches and also the point of this gauge are all 60°, including angle; 60° being the angle of the threads of bolts and screws commonly used, and is the angle for the points of all lathe centers in the United States. A good center punch is also necessary, also a center reamer. This reamer will be described later, when we come to the centering of work. A very handy tool is shown in Fig. 3; this is called a "hermaphrodite," usually erroneously called by most machinists a "morphidite." It is really a compromise between a caliper and a divider or compass. As can be seen, one leg is like a caliper, whilst the other is like a divider. Its uses will be enumerated in due time.

In the turning of cylindrical pieces, such as shafts, studs, pins, screws and so forth, which are turned on the lathe centers, it is absolutely necessary if any kind of a good job has to be done that the lathe centers be true and in proper shape. From my own personal observation of lathes, as usually found in blacksmith and small jobbing shops, the centers of most of the lathes are in such a condition as to prohibit the production of good work, and I have often found when I have taken up this subject with the men who used these lathes that this condition was not due, as might often be supposed, to carelessness, but because these men have had no opportunities to learn the importance of such things. I have found, with few exceptions, that the men who operate country blacksmith and repair shops are above the average intelligence, but in many cases their knowledge has been gathered by themselves and without the benefits derived from seeing many of the operations, which they attempt to do, properly performed by skilled and trained workmen. In other words, they lack the knowledge of the little and seemingly unimportant things, which, however, are the things which make all the difference between the finished and workmanlike product of the skilled mechanic and the unsightly job of the average amateur. Many of these things it is beyond the power of anyone to impart by written instruction, still much can be accomplished by showing reasons for their importance. In the infinite variety of operations performed on the lathe there are many pointers which can be given to the operator which will assist him to become a skilled workman. Much, however, depends on his own powers of observation, of the results obtained and his avoidance of methods which he has observed to give poor results.

Before any work is attempted on the lathe, the lathe must be in good condition if good results are expected. If the lathe which you have is in bad shape through neglect, take a few spare hours some day and clean it up. Take the head all apart and clean everything thoroughly in gasolene. In such cleaning work, first wash all the pieces off, wiping them dry with a rag. Then thoroughly wash and dry your own hands; get a clean, dry rag, wipe the pieces again and start to put them together. I have often seen machinery cleaned in a thorough manner, all the pieces shined up and then the workman start in to assemble them again with hands coated with grease and grit. The result being that when he got through, the machine was in very little better condition than when he started. In assembling, after cleaning all the pieces which run in bearings, they should be coated with clean oil before returning them to their places in the machine. In putting back the spindle into a lathe head, the thing of greatest importance is to have it turn easily, without any play in the boxes, either up and down or end ways. The end play on a lathe spindle is usually taken up by means of a screw at the outer end. If there is a collar on the spindle at the front or nose end, where the face plate screws on, it should never bear against the end of the front bearing. All the thrust, which is quite considerable when boring or face-plate work is being done, should bear on the screw at the outer end of the spindle. The best way to adjust a lathe spindle is to back the thrust screw out a little and put on the bearing caps. Tighten down one of the caps gradually, trying the spindle by hand to see if it rotates freely; keep on tightening down until the spindle begins to turn hard. Then just ease off a little until it turns easy again. Go after the other bearing in the same manner. When you have the caps adjusted, the spindle should turn easily in the bearings, and yet, if you take a crowbar and put the end of it under the cone pulley, no looseness should be felt up and down when prying with the bar. Now tighten up the thrust screw at the end of the spindle, screwing it up until the spindle again turns hard; then back it up a trifle and set up the lock nut. The spindle should now turn freely, yet without any lost motion in either direction. If you have never done this job before, do not get in a hurry. Take plenty of time and do it right, as the quality of the work you will afterward turn out depends greatly on the condition of the lathe. Next, take off the carriage. To do this, the best way is to pull out the head screw and the spline rod first, then unscrew the apron from the saddle. Clean everything thoroughly and try to remember how the different elements behind the apron are positioned and also how they act. A thorough knowledge of every part of the machine you are operating will often be of great value when anything goes wrong. Examine the ways and V on the lathe bed—if the lathe has been roughly used, if hammers and wrenches have been dropped, or even laid, on the ways there will be dents and bumps which may have to be scraped down before the carriage will work smoothly and properly. For scraping these bumps, use a flat mill file, with the teeth ground off at the end, the end being ground square, giving a sharp, square corner to work with. The corner of the scraper should be kept sharp by whetting the flat side and also the end of the scraper on an oilstone. Put the parts back on the apron and attach it to the saddle, adjusting the slide until it works easily without any looseness. Clean, scrape, if necessary, the cross slide, and adjust the gib until it also slides freely without lost motion. The tail stock should then be cleaned, and the Vs on which it slides examined and scraped where necessary.

(To be continued.)

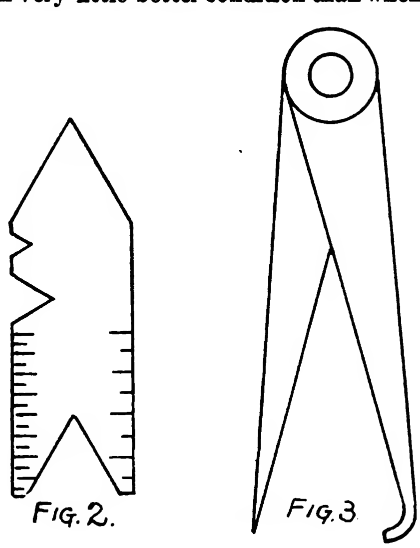


FIG. 2. FIG. 3

A THREAD AND CENTER GAUGE AND A CALIPER

Tongs of Special Design.

J. N. BAGLEY.

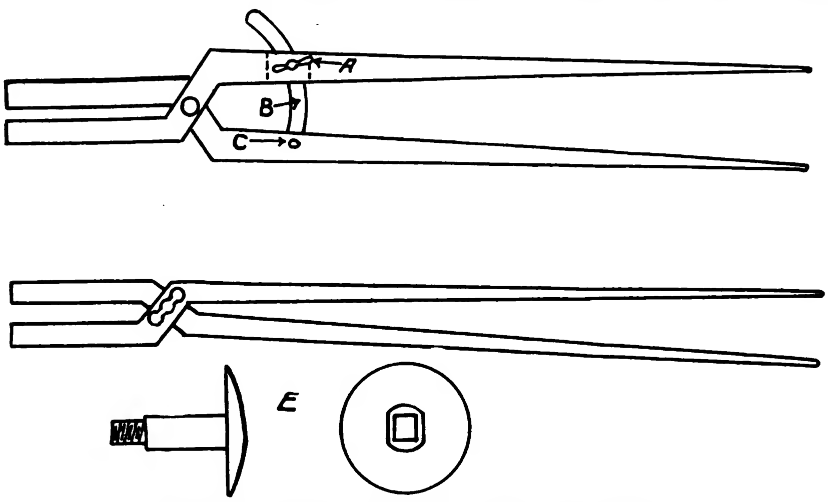
Almost every day something is brought to the shop to be brazed or repaired, and an easy way is to hold it with the tongs while doing the job. The old-fashioned way of slipping the ring

over the ends of the handle is all right, but in case the rings have been misplaced some of our valuable time must be spent in finding them. Some time ago I hit upon an idea that has proved so successful that I will tell the brother mechanics how it is done.

The illustration shows a plain pair of tongs, with the attachment added. About 3 inches back from the rivet, which holds the tongs together, I placed a piece of flat bar steel, ¼ inch thick and ½ inch wide and cut in the shape of a crescent. One end I fastened with a small ¼-inch bolt, as shown at C. Through the other handle of the tongs I cut a slot, as shown by the dotted lines. I then tapped out on one side of the slot and screwed in a set screw with a butterfly head, A, as this could be tightened with the fingers very tight. The piece, B, should be shaped so as to correspond to the swing of the handles as they swing on the rivet. To hold the work secure, simply grip the handles as would be done to slip the rings over, but, instead, tighten the nut A, and the work will be held as tightly as can be held by the hand. If some special job is to be done and the attachment interferes, it can be instantly removed by taking out the small bolt, C, which holds it in place.

Almost every smith has use for a tong for some special piece of work, and many times must spend the time to make it. This is not very profitable if the job is some small one and out of the ordinary, perhaps not coming to the shop once in a year.

I have found the following tong to be of great value in handling the special jobs from time to time. Forge the tongs in the usual manner, after which drill three holes in a straight line, ⅜ of an inch apart, as shown in the engraving. Connect the three holes by cutting a slot from one to the other. Prepare the rivet or bolt to fit the round hole that has been drilled and file two sides flat, as shown at E. This must be placed in such shape that when the tongs are open they can be shifted from one hole to the other; thus the jaws will hold various shaped pieces, and at the same time be parallel with the work held. One pair of these tongs will answer for a number of pairs of the old style and can be made just as light and convenient to handle.



TONGS OF SPECIAL DESIGN TO ASSIST THE SMITH

Making and Repairing Locomotive Frames.

W. C. SCHOFIELD.

It probably was not meant for us to question the design or manner of fastening the frame to cylinder and boiler, but we have taken the privilege to mention it and say that from the results of certain designs and manner of fastening it certainly showed that more thought was given to making and putting together so it would break the easiest, rather than otherwise. But, of course, we, as blacksmiths, should not invade this select territory, but make and repair as directed, which we will proceed with, but in passing will say that we believe that a frame properly designed and made by the best method and then fastened to the cylinders and boiler properly, the frame will be no more apt to break than is the boiler.

In making wrought frames from scrap, which is the usual practice, too much care cannot be taken in selection of scrap. Many think the slabs should all be double-worked; others that single-worked is best for backs and double-worked for limbs. In our opinion the most important is that a sufficient number of slabs be used for making back, so it can be properly worked while hot, and to not use such a small pile, so that you need not be afraid the hammer driver will hit too hard. In short frames, pile large enough to make without fagging on. In consolidation frames or very long frames, make in two halves.

In forging legs, use double-worked slabs, leaving at least 4 or 5 inches for brace or lower rail welds, or longer if bent. Now, when it comes to the fire, it is absolutely necessary to have a good man behind the gun. Have the best smithing coal, for, unless you can get good heat, it makes no difference whether you put a limb on in one, two or three heats—it will not be a substantial job. It is not necessary that a forged frame should look smooth and as symmetrical as a smaller forging, but it should not look like it had been blown out of a quarry. From present indications it seems it will be only a short time when making frames in smith shops will be one of the lost arts, for steel frames are being cast that seem to answer every condition of service, and since the foundry people can cast without using a Gatling gun they have quit saying that it cannot be helped, and that the holes help rather than hurt, and I, for one, believe that a good cast-steel frame will give as good service as wrought iron.

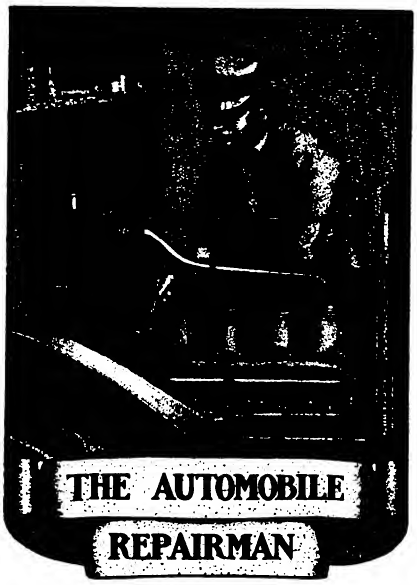
In repairing, we make no distinction between a wrought-iron and a cast-steel frame. In repairing, oil welding in many places is first class, but many have condemned oil after their first trial. Each break may require just a little different treatment, but anyone will find that each job, gone at intelligently, will show marked improvement over previous ones; so find it is a constant study just how to get best results.

Next, Thermit welding: the more we use Thermit, the more uses we find for it. It certainly is the easiest way yet found, and if properly done the repair will be found as strong if not stronger than the unbroken frame.

Oxy-acetylene certainly has possibilities seemingly unlimited, but as yet it is in its embryonic state. As to repairing on the anvil in the good old-fashioned way, none will say anything is better, but some methods are possibly cheaper, easier and quicker.

I have nothing new in ways or methods of repairing in smith shop different from what has been repeatedly said, but will say that I don't think I would take a frame down to either use oil or Thermit, but would do it in smith shop, and in conclusion will say that it has not been my experience that frames repaired

by any method give no further trouble, but are like our poor relations—always with us.



Troubles With the Ignition System and How to Remedy Them—2.

HAROLD WHITING SLAUSON, M. E.

In order to transform a ten-volt current to one of 20,000, a break must be made intermittently in the flow of electricity from the batteries. This break is obtained by means of an interrupter, or vibrator, placed on each coil. When the current passes through the winding of the coil, its iron core is magnetized, and the vibrator is drawn down a short distance. This breaks the flow of current, the core loses its magnetism, and the vibrator springs back to its normal position. But in this normal position contact is made so that the current again flows through the coil, and the above-described process is repeated very rapidly and causes the well-known hum, or buzz, of the coil.

There is a considerable amount of heat at the points on the vibrator and connection screw at which the contact is made and broken, especially if adjustments have not been made properly. The piece with which the vibrator comes in contact when it is in a normal position is called the contact screw, and this is threaded so that the distance to which the vibrator can spring back may be varied. The contact points of both the vibrator and screw are of platinum, as this material will withstand the heat better than any other suitable metal, but even this will require attention frequently. The occasional sparking at the points of contact will finally cause the platinum to become pitted. When this occurs, the contact screw and vibrator must be removed, and the platinum points cleaned with emery cloth until they are smooth and bright.

The readjustment of the vibrator and contact screw is rather a delicate operation, for upon the proper regulation of these parts of the coil depends the current consumption of the batteries and the efficiency of the spark in the plugs. If possible, it would be advisable to return these to the same position and same relation with each other as they occupied before removal, but as some of the platinum will have been worn away by the polishing, a new adjustment must be made. The vibrator should be set so that, before the contact screw is in place, it will rest less than ¼ inch from the core of the coil. The contact screw should then be turned down until the two platinum points touch and the vibrator is depressed the slightest fraction of an inch. If the current from the batteries is now sent through this coil, a faint buzzing will be heard, which will increase as the contact screw is turned down. When a vibrating coil is working properly it will give a well-defined, constant buzz that should change pitch as long as the current is on. It is probable that the final position of the vibrator when held down by the contact screw will be about ⅛ or 3-16 inch from the core of the coil.

The buzz, especially with new batteries, should sound strong, but if the contact screw is turned down too far, the tension on the spring of the vibrator will be so great that the magnetism in the core of the coil cannot separate the platinum points readily. This will result in an undue current consumption from the batteries, and in a coil that will "stick" easily. After the contact screw has been so set that a healthy buzz is obtained, the switch should be thrown on and off several times in order to make certain that the vibrator starts readily as soon as the current is supplied. A "stiff" coil, or one in which the vibrator spring tension is too great, will sometimes continue to buzz properly when it is once started by depressing it with the finger, but it is not sufficiently delicate to give good service under ordinary conditions. This stiffness may be remedied by bending down the vibrator, readjusting the screws that hold it in place, or by turning up the contact screw against which the vibrator rests. If the vibrator spring had not previously been too tight it is probable that the contact screw has been turned down too far. In replacing the vibrator and contact screw, care should be taken so to adjust the former that the two platinum points on the two pieces in question will "register," or come into perfect contact when at rest.

In the ordinary system of battery ignition, in which a separate coil is used for each cylinder of the motor, a convenient method of testing out each spark is provided without the necessity of removing any of the spark plugs. It is oftentimes difficult to determine in just which cylinder skipping, or missing of explosions, takes place, but by cutting off the ignition from all plugs but one the motor may be made to run on this single cylinder, and the frequency and nature of the explosions may then be readily observed. Any cylinder may be "cut out" by removing the cover of the coil box on the dash and depressing the vibrator of the coil connected with that particular cylinder. By alternately cutting out three different cylinders at a time, the cylinder in which the faulty ignition lies is easily found, and then the directions already given for tracing the trouble to its source may be followed.

The high-tension wires leading from the coils to the spark plugs have to carry the entire voltage of the current, and as such a pressure of electricity can find its way through any ordinary covering, these wires must be especially well insulated. With covering, these cables are usually at least half an inch in diameter, and yet the wires themselves that conduct the current are very small, probably not over a sixteenth of an inch through. Oil and gasoline are very injurious to the insulation of these wires and are the cause of many short circuits. The rubber deteriorates very rapidly under the action of these hydro-carbons, and there will soon be minute holes eaten in it, through which the high-tension current will find its way to the iron of the motor. For this reason the wires leading to the spark plug should be kept away from the oil and grease that is liable to collect around the motor. It has sometimes been found a good idea to cover the insulation of these wires with a coat of shellac. Whenever the covering of a high-tension wire is found to be worn, the entire cable should be renewed before any trouble arises from short circuits.

The majority of automobiles today are furnished with magnetos for producing the current for ignition purposes, and this equipment has been found to be much more reliable than the battery system. Storage batteries are often used, but these must be charged occasionally and cared for with particular attention, especially in winter, and they

are consequently generally installed only as an auxiliary source of current supply in connection with a magneto. Nearly any one of the old-time cars can be equipped with a special form of magneto, designed to make use of the same plugs and coils already provided, and many a worn-out automobile has been regenerated through the installation of this modern type of ignition. Magnetos occupy such an important place in the ignition field, however, that they are worthy of treatment as a separate subject, for there is much about them with which the ordinary automobile repairman should be acquainted.

Foundations For the Gas Engine.

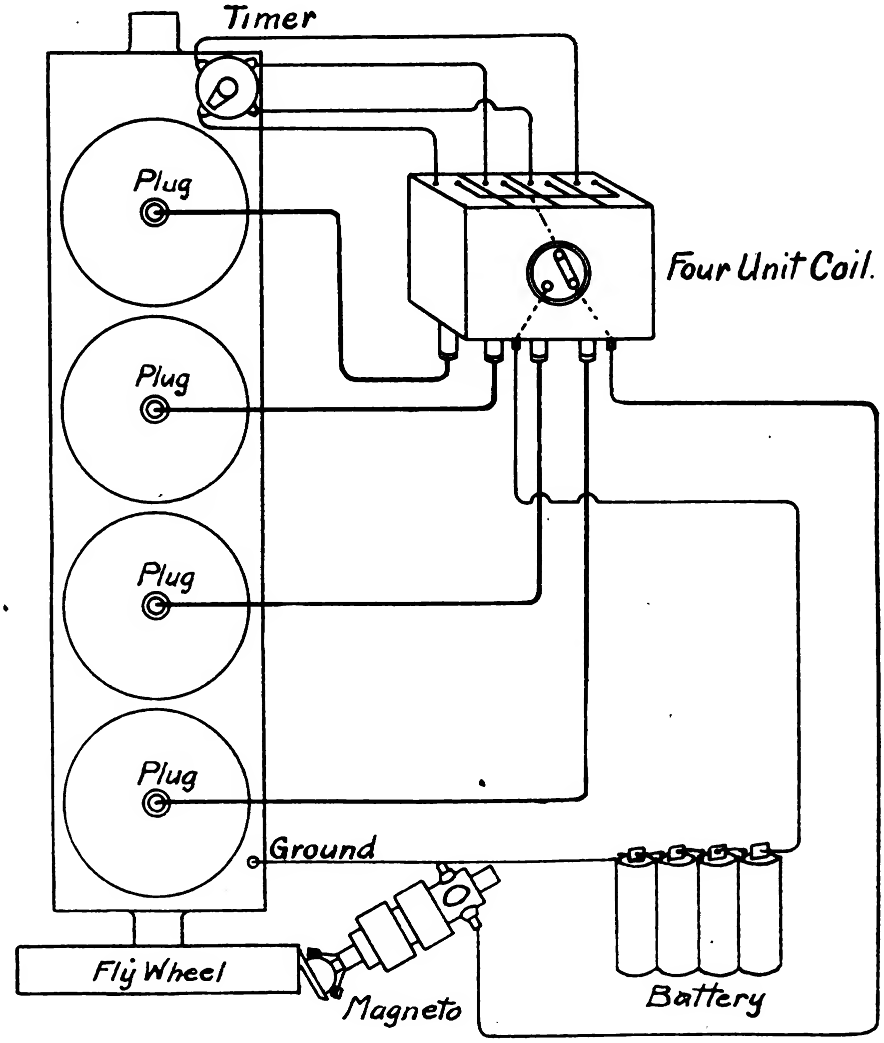
J. N. BAGLEY.

The first and most important thing in order that an engine give satisfaction is a good foundation. The foundation may be made of various materials; brick, stone, cement, etc.; however, if properly constructed, concrete seems to give very satisfactory results. The following manner of mixing seems to be about right in most cases. Two parts cement, four parts sand and from six to eight parts fine crushed stone, or, in place of the stone, a coarse gravel will answer very well.

Now, as to the depth of the foundation; it will depend almost entirely on the soil; a sandy, loose soil will require a greater depth than solid soil. If the engine is small—say from two to five horsepower—a foundation from three to five feet below the grade line will be about right to get a solid setting. The foundation should also be below the freezing point to insure best results. Engines of larger horsepower, ranging from fifteen to fifty horsepower, will require a foundation from five to ten feet, depending on the condition of the soil.

The sides of the foundation should have in most cases a slope of about 15 degrees, and at the extreme bottom it should be twice the length of the engine base. The width should be twice to three times the width of the engine base. After the foundation is complete and the capstone in place it should extend above the ground, so as to allow the flywheels clear about six inches. If the foundation is to be made of cement it should not be made during freezing weather, as frozen concrete is absolutely worthless as an engine foundation, for it will crumble and crack as soon as the engine is placed.

The engine must be made fast to the foundation to keep it from shaking about; this is done with anchor bolts, the number being determined by the engine builder and the size of the holes in the base. The length of the anchor bolt in almost every case should be long enough to extend from the bottom of the foundation to about five inches above the capstone. The anchor bolt should be fastened to a good-sized anchor at the bottom, and be threaded at the top to receive a nut; which when set down will hold the engine firm.



WIRING FOR FOUR CYLINDERS FOR JUMP SPARK. A DIRECT CURRENT REPLACES THE SECOND SET OF BATTERIES

The anchor is generally about $\frac{3}{4}$ of an inch in thickness, four to six inches wide, and about a foot long. There must be a hole near the center to fasten the anchor bolt. When the anchors are placed it is good practice to set them on a piece of pine board about twice the size of the anchor. After the anchors are placed secure a piece of common gas pipe and place over each bolt. The inside diameter of the gas pipe should be three to four times that of the anchor bolt. The pipes should not extend to the top of the anchor bolt, but just to the top of the foundation. And, next in order, will be the template.

The template is a substitute for the engine base and may be made of either wood or metal, but wood is used in most cases, as it is just as good and not so expensive. The template should be made with the holes exactly as those of the engine base, for, after the template is removed, the engine base is supposed to fit without any changing of the bolts. Screw the nuts down about two inches on the bolts and let the template set on the nuts while the foundation is being made. When all is ready, place the bolts in position, drop the pieces of pipe over the bolts, place the template, letting it rest on the nuts, line the bolts with the line shaft, or the building, and stay the template in position and you are ready to build the foundation.

After the foundation is complete and the bolts are found to be in the exact position to enter the holes in the engine base, fill the pipes around the bolts with a slush of cement and sand and let harden. Three days to a week should be allowed for the foundation to set

before placing the engine and making it fast.

After the foundation is complete apply two coats of paint, as this will fill the pores and improve the looks as well as prevent the drip oil from soaking in and collecting dirt. Many an engine has failed to give satisfaction for the want of a good foundation. Do not try to install the engine cheaply, as it only adds to the expense bill in the long run, and nothing is gained; in fact, the life and success of the engine depends on the setting. Beware of the man that advertises his engine to run in "any old place." An engine cannot develop its rated power, jumping all over a building, besides it gets it out of line, causes unnecessary wear and shows the lack of judgment of the owner. Make the first investment in a good foundation. If the engine is worth having, it is worth caring for.

Gun and Novelty Repairing—18.

W. G. MUMMA.

Receipts, Formulas and Notes.

The best material for cleaning silver is a thin paste made of alcohol, two parts, ammonia, one part, and whiting enough to form a liquid like cream. This should be smeared over the silver and allowed to stand until dry. If then brushed off with a very fine cloth the silver will appear clean and bright. The alcohol and ammonia dissolve all dirt and sulphide, which are then absorbed by the whiting and removed. If a good quality of whiting cannot be procured, starch may be used.

To waterproof canvas, dissolve soft soap in hot water and then add a solution of sulphate of iron, this is washed and dried and mixed with linseed oil. The soap prevents the oil from becoming hard, and water has no effect on it.

To bronze articles, take shellac and dissolve in alcohol and add the bronze powder in proportion of one part of the bronze to three parts of the shellac. The surface to be covered ought to be smooth. The mixture is painted on, and when a sufficient number of coats have been given the object is well rubbed. Or, coat the object with copal or other varnish and when it has dried so far as to become tacky dust the bronze powder on it with a soft piece of cloth.

A composition used by sawmakers for tempering saw blades and is applicable to other articles of a like nature is a mixture of two pounds of suet, one quarter pound of beeswax and one gallon of whale oil. Boil all together. The addition of one pound of black rosin to a gallon of the mixture makes it serve for the thickest blades or pieces. The rosin should be added with judgment, or the work will become too hard and brittle. After being used for a couple of weeks the composition becomes useless.

For all coarse grained woods that have to be filled it is best to put on, after filling, a thin coat of shellac, colored to suit the color of the wood. It acts as a binder, keeps the wood from changing its color and prevents the varnish from sinking too deep into the grain of the wood. The wood is then ready for the varnish coats.

All coats of stain, shellac or filler need to be lightly sandpapered and cleaned of all dirt before putting on the finishing coats of varnish or hard oil.

All coats of hard oil or varnish should be rubbed with fine pumice stone mixed with linseed oil for egg shell gloss. For a dull finish, use powdered pumice stone and water for rubbing. For a polished finish, rub first with fine pumice stone and water and then with fine rotten stone and water.

If the cyanide of potassium refuses to melt when using it in casehardening it is because it has become air slaked. It should be kept tightly sealed in cans to keep it—let no air strike it.

The best lubricator to use in drilling copper is a small piece of tallow, particularly when a small drill is used.

For polishing brass, take three ounces of powdered rotten stone, two ounces of pumice stone, four ounces of Oxalic acid, two quarts of rain water. Mix together and let stand several days when it is ready for use. Shake well before using or applying. Polish with a dry woolen cloth or chamois skin.

For heavy work and fast running journals a lubricant can be made by mixing equal parts of sperm oil, cylinder oil and common machine oil.

Recipe for casehardening mixture. Three parts of prussiate of potash, one part of sal ammoniac and one part of bone dust.

Remove the scale from drop forgings that have to be machined, by using one pint of sulphuric acid in twenty-four parts of hot water—dip pieces into this mixture.

To remove rust from a polished steel surface without scratching the surface, take eight parts of tin putty, ten parts of prepared buckshorn and 250 parts of spirit of wine. Mix to a soft paste and rub on the surface with a woolen rag until the dust disappears, then polish with a dry, soft cloth.

Silver solder (hard), take one ounce of fine silver, one hundred and five grains of shot copper, thirty-six grains of spelter.

Easy silver solder, take one hundred and thirty-six grains of fine silver, thirty-six grains of spelter, one hundred and eight grains of shot copper.

Gold solder, take one ounce of fine gold, one hundred and forty-four grains of fine silver, ninety-six grains of copper wire.

To pickle brass castings, take three parts sulphuric acid, two parts nitric acid. Mix and add to this mixture one pint of common salt and stir until it dissolves. Use an earthen vessel and then dip the articles deep. Remove at once and rinse in clear water. This will clean and brighten the castings.

To drill glass or porcelain, place in the drill chuck and speed as high as possible, a piece of iron wire $\frac{1}{32}$ of an inch smaller than hole to be made. Grind the end flat and feed to the work slowly, using plenty of oil and emery.

Recipe for tempering mill picks and drill hammers and all other work that requires a tough, hard surface without drawing temper. It can be used on edged tools by drawing temper. Make mixture as follows: one eighth ounce of corrosive sublimate, one eighth ounce of magnesia, one ounce of sal ammoniac, one ounce of alum, one ounce of salt peter, one ounce of borax, one ounce of oil of vitriol (sulphuric acid), one pound of salt, three gallons of soft water. Work the steel with care and heat to a cherry red and dip.

To harden and temper dies and punches. Heat to an even heat and then plunge into a bath of fresh, clean water with some salt added. Have the water warm, about 60 or 70 degrees. Move the work back and forth until

cool, then hold it in the flames of the fire, moving and turning it around in the fire until it is quite hot, so that it cannot be handled. This prevents cracks or internal strains. Now take a plate of iron and place on the fire. Brighten the top of the die with emery paper and then rub some oil so as to dampen it. Now place it on the iron plate and heat up. Move the die around until an even straw color appears or until a fine file will take hold. Then plunge into an oil bath until cool.

To dress and harden cold chisels, work the steel at a good even heat, not too cold. Then take water at a temperature of about 95 degrees. Then harden in this with a little fish oil on top. This keeps the steel from chilling.

To temper butcher knives, heat to about red and plunge into water three times or more. Then heat the blade, but not red, and dip into linseed oil three times. Now heat the blade to orange and dip into linseed oil again until cool. It is now about as hard as it can be. Polish the blade so as the color can be seen easily and then draw the color by drawing the blade over a piece of iron heated to about red until a golden red and blue mixed is seen. Then plunge and cool off in oil or water. If this is properly done the blades will not spring or crack.

Hardening reamers. Heat slowly and evenly to a bright cherry red, quench quickly and immediately immerse in a bath of linseed oil, holding the reamers vertical, then draw the temper.

To make iron or steel rust-proof and to give it a nice finish, heat the article to a dark red and dip into raw linseed oil. Hold it there for a few seconds and then take out and let cool and wipe dry.

To drill hardened steel, use an old-fashioned flat drill and temper hard. Use camphor and turpentine in place of oil.

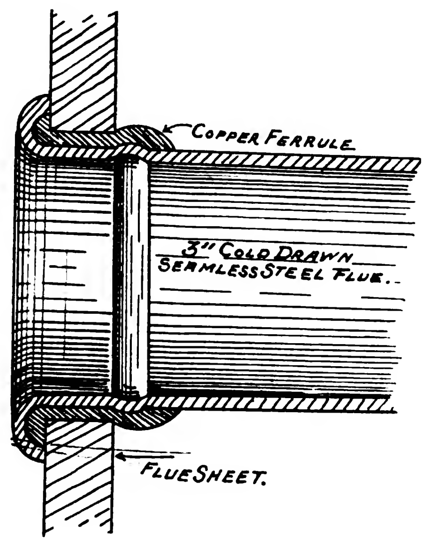
To whiten a surface for laying out work, mix whiting with gasoline to the consistency of paint. Then paint the surface. The gasoline will soon evaporate, leaving a white surface ready to scribe lines on from the pattern.

Belt dressing. Take a pound of beeswax and melt in a gallon of neatsfoot oil. Use a gentle heat or melt the beeswax first and then add the oil slowly, stirring until well mixed. This dressing will do no harm to the belt and is as good as the best.

How to Re-Tube Old Boilers.

JOHN, THE BLACKSMITH.

First, use only cold-drawn, seamless steel tubes, tested true to gauge, outside diameter three inches. Remove old tubes by cutting them out with a tube cutter, and have a 3⅛-inch reamer to true up old tube hole, or enlarge sufficiently to allow the copper ferrule to be driven in over tube. Copper ferrules are $\frac{1}{16}$-inch thick and are made in wedge shape, so that they may be driven in tight. When the end of flue is beaded over and expanded, this copper thimble or ferrule fills out any possible cracks or holes in the steel and makes a perfectly tight union. This expands readily under heat. Usually a person should not drive the tube expander in too quickly, or try to roll tube with one effort. The tube expander should be driven five or six times, and this will tighten up the flues slowly and make a tight union. In the



HOW TO RE-TUBE OLD BOILERS

engraving, at X, is shown how the inside end of the copper ferrule is tightened up with the hammer drive expander. The roller expander is, however, mostly used. It is best to have two expanders when putting in new tubes as shown, as the hammer drive expander is used to bulge the tube one-eighth inch outwards, as at X.

Method of Safe-Ending Flues.

JOHN J. ROCHE.

After the flues are removed from the boilers they are taken to the flue shop by two laborers and placed in an iron churn, 60 inches by 20 feet, revolving 30 revolutions per minute. Two men charge the churn with from 270 to 350 flues, according to the diameter. These are churned from 1 to 1½ hours, depending upon the condition and dirtiness of the flues. From the churn they are taken to the cutting-off machine, where one inch is cut off each end, the capacity being 70 flues per hour, operated by one man with air device, consisting of two rollers on bottom and knife at top. They are then placed on testing machine, capacity being 60 flues per hour, tested at 350 pounds per square inch. The flues are tested previous to welding, so as to have the percentage of leaks at new welds kept down to the lowest percentage. The percentage now being from 1 to 1½. The testing is also done for the purpose of throwing out old flues condemned at old welds, thus saving time and material. They are then moved to scarfing machine—capacity 100 flues per hour—handled by one man with air chuck to hold flue while plunger having a taper reamer 3 inches in 12 inches is applied by air. It is inserted the depth of one half inch, the flues are then ready for welding.

The welding outfit consists of a Ferguson oil furnace and McGrath air hammer—capacity, 50, 2¼ inch; 62, 2 inch; 75, 1¾ inch, and 80, 1½-inch flues per hour. This machine is operated by one welder and two helpers. The one helper places flues in furnace and the other supplies stock and takes care of the finished flues. They are then taken to the cutting-off machine, where they are cut to gauge, capacity being 80 flues per hour, having two rollers on bottom and knife at top, also grinding device at end to remove scale from end that fits in flue sheet. The machine is operated by two men, one who looks after cutting-off knife, the other the grinder. They are then carried to swelling and annealing machine, consisting of roller at top and spindle at bottom, operated by one man, the flues being swelled to size of front flue sheet, this machine having a capacity of 75 flues per hour. They are then placed on trucks, ready to be taken to shop and applied to boilers.

Safe ends are scarfed on scarfing machine, having a capacity of 90 flues per hour, using air chuck to hold the ends, using plunger having 4-inch cutter, taper 3 inches in 12 inches, this being operated by one man with air power.

Soliciting Business and Collecting Accounts by Mail.

A Series of Straight-to-the-Point Articles Illustrated with Letters That Have "Turned the Trick."

BY THORNTON.

You may start a letter well, may get your would-be customer's attention, and you may hold his attention throughout the letter, but if you don't convince him, if you don't say something that will prove what you have said, "What's

the use?" In other words, what's the good of your letter?

For example, you may write such a letter as will get the reader's attention and hold it by reason of its very absurdity. But, because you have held his attention, doesn't prove your words. You must convince your man. You must prove what you say.

It is not enough to say: "I have sold fifty buggies just like this, and all are proving satisfactory." You must prove that. Tell your man who bought those buggies—tell him to ask the purchasers about them.

Don't simply say you make a specialty of curing corns in horses' feet, or that you make a specialty of diseased feet. Tell your man the names of the parties owning horses that you have cured. Prove your statements—not when asked for proof, but right at the time you make them.

For example, we will take a general smith, starting in a new town. As a usual thing, this smith will advertise in the local paper about like this:

I, Charles Ballinger, have purchased the Needham shop and will open a first-class blacksmith business the first of January. I will make a specialty of shoeing, etc., etc.

The smith not only puts that ad in the paper, but he generally has a number of handbills on cheap paper distributed. Now, of course, this is advertising, and is better than nothing. But how much better it would be to say something about experience, other localities where employed and, if possible, print some testimonials and recommendations.

For seventeen years I've been following smithing—have done nothing else. A man should know something about it in that time.

And that seventeen years' experience is at your service. I have purchased the shop opposite the postoffice, and after alterations will open it about January first.

I was formerly located in Porterville. If you have friends there, write them about me. They will tell you what kind of a mechanic I am.

Ask Dr. J. K. Williams, of Porterville, about my ability to shoe and treat horses' feet.

Ask Mr. T. L. Murray, of the Porterville Livery, about my work on wagons and vehicles.

They all know what I can do, and I will willingly do the same, and more, if possible, for you.

Even should the man who receives that letter be unwilling to write to the persons named, you will have impressed him with the fact that you are willing he should. And he will naturally reason that if you have anything to be ashamed of, or if you can't "deliver the goods," you wouldn't tell the names of former customers.

If you have been located in your own town for some time your proof is still easier to secure. Refer your would-be customer right to people he knows. Suggest that he call them up on the phone. Tell him: "Ask neighbor Brown about me the next time you see him," or say, "Ask Tom Baker about my work—ask him if he is satisfied with my shoeing." Clinch your statements by giving the would-be customer proof that cannot be disregarded.

But don't prove your statements in the same way in every letter. Don't refer to the same pleased customers every time. Don't send out the same testimonial month after month. Prove your talk differently—vary it in every letter. "If you are not satisfied, we'll charge the work to profit and loss" is a good variation from "We'll refund your money." If you sell axle grease, say; "Buy a small pail, try it on any wagon you run. If it's not satisfactory bring in the unused portion and we'll return your money." If you handle auto jacks, say: "Use the jack for a month. If you don't think it better than any other on the market, bring it back and we'll thank you for your criticisms."

If you are talking about wagon repairing, refer your prospective customer to some satisfied customer the first time you write him. The second time say: "Remember, we'll do your vehicle repairing only with the understanding that you are perfectly satisfied." The next time tell him: "We do not consider any job complete until we have your assurance of satisfaction." In your next letter say: "Every job we do, from the replacing of a bolt to the complete overhauling of a vehicle, must satisfy you before we consider the job complete." And so vary your statements so they will not become stale. Don't say anything you don't mean, but get some strong proof into every letter. Back up your statements. Clinch them tight.

Did You Get Some?

There are still a few calendars left. If you haven't yet secured some for advertising your smith shop, better send in your order immediately. Some of "Our Folks" have already sent in their second order. There's no question about the value of these beautiful calendars as an advertisement for the smith shop. But there is some question about your getting any unless you order today.

"Hello, Benton," said the Editor, as the man of receipts came in. "You're just in time. I want a receipt—in fact, I want several of them."

"Glad I dropped in, Mr. Editor," returned Benton, removing his coat, lighting a cigar and making himself comfortable. "Fire away."

"The first thing I want is a belt cement—something good, that can be depended upon."

"I've got just the thing. The quantities mentioned may be larger than is wanted by your reader, but he can cut it down if he desires. Take $8\frac{1}{2}$ pounds of the best glue and $2\frac{1}{2}$ gallons of cold water, and let stand over night in a cold room. In the morning place the mixture over a gentle fire and allow to dissolve. Now stir in $\frac{1}{2}$ pint of Venice turpentine and $\frac{1}{2}$ gallon of Martin's belt cement. Allow the mixture to simmer for about four hours over a gentle fire, being careful not to allow it to boil. This will give you a good belt cement."

"That will probably suit our readers' wants just right," said the Editor; then, continuing, "Now, I wonder if you can give a reader some information on belt dressings. Here's a man who says that he has been making his own belt dressing. He says that, while it appears to work satisfactorily on the belt at first, it does not seem to preserve the leather nor to keep the belt from slipping after being used for some time."

"His belt has probably begun to get stiff and to glaze," returned Benton. "If he will procure some crude castor oil and apply it to the belt hot, he will find it the best belt dressing he ever used. It preserves both the grip and also the life of a leather belt. On a rubber belt the only thing that should be used is hot soap suds."

"What has your receipt book to say about a lubricant for use when cutting threads on steel?" then asked the Editor.

"I just came across something the other day," returned the other, turning the leaves of his receipt book. "Here it is now. Use a mixture of lard and turpentine and apply it with a brush. The proportion is about 1 part lard to $\frac{1}{2}$ turpentine. This, I understand, gives the best results."

"Very good, Benton," said the Editor, turning to his desk. "I want to finish up this manuscript now. You'll find today's papers on the table there."

Jim Fair's Idee o' Success.

W. O. B.

(Jim Fair, y'll 'member, is the village smithy up t' Sneetz'es Crick.)

When one hes pass'd the noon o' life,
An' dusk is drawin' nigh,
When peace should take the place o' strife,
An' one begins t' sigh,—
One thinks, es he reviews his tasks,
O' life's hard toil an' strife,
He wonders long, an' then he asks:
"What is success in life?"

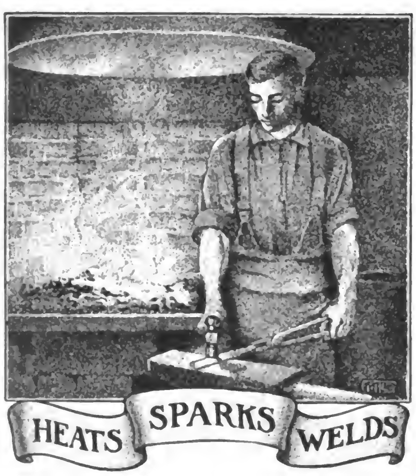
Some seem t' think success is bro't
With strivin' for much gold—
Y' can't deny that much is bo't
By riches, an' much sold.
But when y've pass'd the noon o' life,
What comfort is thur in
Ten chests o' gold, if all yer life
Yer conshunts cut like sin.

An' then sum others seem t' look,
With longin' eyes on fame;
They'll fight a duel, er write a book,
Er fly an aeroplane.
But does such fame bring comfort, when
The shades o' nite draw nigh?
Does fame by blood, er wing, er pen
Bring ease t' yer last sigh?

Success is not in gold er fame,
Er other things like that,—
Tho' sum folks strive ter make a name
Er wear a golden hat.
It's what y' hear yer conshunts tell
Y', what y've done an' ben—
It's not yer business—what y' sell—
But how y've treated men.

ENVOY.

When one hes liv'd his life, done good,
An' kep his conshunts clean;
Hes helped his brothers when he could,
An' frowned upon things mean.
When one hes lov'd, an' laf'd, an' work'd,
Hes had his time t' play—
Hes done it right, an' never shirk'd—
He's found success, I say.



There's not very much left of nineteen ten.

Better think twice before cutting prices—and even then, don't do it.

It takes more than a leather apron and a rattlety-bang on the anvil to make a man a blacksmith.

Try stimulating your trade by giving five per cent discount for cash. It may solve your long credit problem.

Are you still holding your order? Last year several orders for calendars came too late. Better send your order in today.

How's your engine working these days? If you are treating it right, it will treat you right. Of course you've got an engine!

How does November of this year compare with last year in a business way? Is your business growing? Of course you know?

You can make money from ads—without advertising. Ever think so? Read "Timely Talks With Our Subscribers," and learn how.

Of course, we wish you, one and all, a very Merry Christmas. May the holiday season find you all in perfect health and happiness.

The Pink Buffaloes still continue to scurry back and forth. How is your supply? We've just received a new lot from our engravers. Better send for some.

Are you taking care of the automobiles that come your way? Better get in line to care for this business. It belongs to the smith, and you should get your share.

Don't forget, we'll give you six months' credit on your own account for every new subscriber you get for "Our Journal." Good way to pay for your own subscription.

> **Uncle Billy Martin says:** "'Taint the fear o' hell thet keeps most folks in the straight an' narrow—it's the fear o' the newspapers."

Some men seem to think themselves real, live hustlers, when, in fact, they just keep fussing about. 'Tis not the appearance of hustling that brands a man as a doer of deeds.

It's not too late yet to start things going for an association. Ask the Secretary for his easy plans. It'll surprise you how easily an association may be started. A postal will do—write today.

You can help your neighbor well along toward a Merry Christmas by getting him to subscribe to "Our Journal." Back up your greeting by handing him a copy of THE AMERICAN BLACKSMITH.

Every fair-minded business man knows that poor work is profitless. Yet some smiths go on year after year turning out the same careless jobs, and then they wonder why they don't get ahead.

A blacksmith whose name is Tom T.
Is as lazy as he can B.
He'll stretch and he'll yawn,
At noon, night and dawn,
But he never works much, you can C.

A good trainer is careful of the young horse; he knows that it's easy to hurt the colt by one heavy strain. And the same applies to boys. The good trainer of apprentices keeps a watchful eye on his charges.

Good time now to look up a side-line. Have you read the ads carefully in this issue? If you'll look, you'll find several suggestions for side-lines. And if you can care for a side-line better grasp the chance for more profits.

The quantity of work a machine does is something, of course—but the quality of that work is the main thing. And, while a man may do an awful lot of work in one hour, the quality of that work tells whether or not he is a good workman.

How long are you going to wait before sending in an item for publication? You enjoy and profit by what others write—surely you have something of interest and profit for your brother readers. Send something to the Editor in time for the next issue.

Get after your outstanding accounts while they're young. Now's a good time to look after collections. And then run over the accounts every month, if you don't want them to overrun. It's far easier to collect a young account than an old one. You'll keep collections to the lowest possible point if you never allow your accounts to get old.

It isn't salesmanship that sells a fifty-cent article for twenty-five cents—anybody can do that. True salesmanship is the art of selling an article for what it is worth. A cut price means either poor goods or poor salesmanship. When a smith cuts prices he admits that he is either a poor workman or a poor salesman. Good workmanship, rightly presented, will always claim and get its just dues.

Where would you be and what would you be if you depended upon yourself alone for new ideas, methods, hints and kinks? What would you know? When you have something of interest to the craft, pass it along. A fair and liberal exchange of ideas and the unrestricted discussion of craft matters tends towards a better general understanding of, not only the craft, but the men in the craft. Let us, one and all, think on and consider these things.

A blacksmith is called upon for a great variety of work, but seldom is he called upon in the field of surgery. However, we learn that a hen with half a beak of tin is picking up corn in Anderson, Indiana; and John Snellson, a blacksmith, is credited with the operation. The hen, so the story goes, was hatched with the lower part of the beak shorter than the upper part. While the chick was fed on soft food, the chicken developed, but when it tried to pick up food like other chickens, the short half beak was not sufficient. So Snellson comes to the rescue, measures the beak and makes a half beak of tin. This he fastened to the short lower stub and, ever since, the hen has been doing very nicely, thank you.

Twenty-five thousand dollars for a business that cost eighteen hundred eleven years ago is the offer said to have been made to Mr. W. F. Robertson, a Washington State smith. Mr. Robertson has accumulated a fortune from his work since locating in Spokane in 1898, and expects to retire at the end of the year. He is fifty years old and rides to work in a high-power automobile. He employs five men in his shop, and proves that an automobile does not unfit a man for hard work by working nine hours a day at the forge. His shop is modernly equipped in every way. Mr. Robertson also owns an orchard near Spokane, where he has made a study of pear growing. If he retires he expects to devote the rest of his years to horticulture.

American Association of Blacksmiths and Horseshoers.

The past three months have seen the formation and organization of a number of county branches. And, while the number was not as large as we would like it, we are satisfied that our continued hammering is resulting in some good work. Of course, organizations cannot be formed all over the country at one time. We must come to it gradually. A reform movement if taken up too quickly is usually dropped quickly. We of the American Association are building for all time and the foundation must be solid through and through. What we want for the foundation is good, healthy, growing county associations; associations that we can rely upon for support; branches made up of live shop-owners, progressive craftsmen and up-to-date smiths.

The reason that more rapid progress has not been made in the formation of branch associations is because the smith fears that his neighbor will be unwilling to coöperate with him. But, what is worth anything, is worth trying for, and organization is certainly well worth the trouble of visiting the neighborhood shops and convincing your neighbor smiths of the value of an association. Of course, the greatest benefits result when every craftsman in the county is a member of the organization, but because a few smiths are blind to the benefits of an association is no reason for your hesitation. Just get the other smiths solidly organized, and it will not be long before these smiths will see by the various reforms, benefits and the changes in local conditions that membership in the association is an unlimited benefit. Now, why not lend your aid? We want your help and you want ours, therefore, why not get my "Easy Plans" now? Just drop me a postal—will you write now? Remember to address,

THE SECRETARY.
Box 974, Buffalo.

Paint-Shop Troubles of Today.

W. A. RIGGLEMAN.

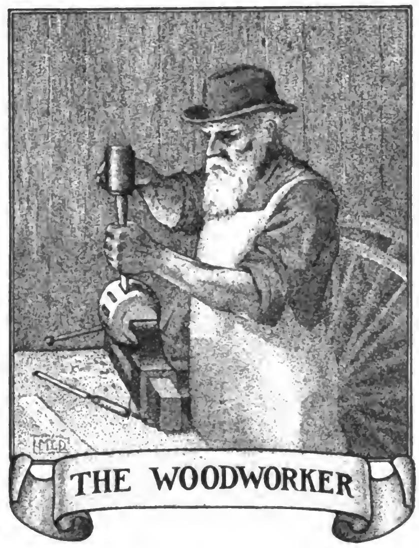
In starting your paint shop look up some good varnish and color firms and lay in your season's stock; also look to see what brushes you need, or the kind your painters prefer. If you have no painter employed it would be best to wait till you have one, and purchase the kind of brushes and stock he likes best. He will then have no cause for complaint and no excuse for not doing good work, while you will have every reason to expect good work from him, as you have bought the stock and tools he preferred. If you buy from every agent that comes along, your painter will always make it an excuse for poor work on his part. If the people for whom you do painting complain that your job has not held out well, you do not know where to place the blame if you have been buying from any and every agent. But if you have been using a certain kind of stock, and same has proved good, you will not like to change. However, your new painter might have bad luck with it. Get what he wants. You have then done your part; let him do the rest.

One coat of good stock is better than three of bad. There is always in evidence the disagreeable shop-owner, with whom the carriage painter has his troubles in getting good stock and brushes. This owner will say: "My other painter used them." He forgets that all men do not work alike or use the same tools. All he thinks of is doing the work cheaply—simply to outdo some other shop. This is what keeps wages low. Do good work; get good prices; give your help fair wages, and you will get more work in the end, and you, yourself, and your help will feel better about it.

In buying your stock, do not overlook getting some repair cards upon which to number your jobs. On these cards you can mark everything connected with the job. For instance, when the job comes in and when it goes out. Some firms make repairs card for automobiles, and there will be a great many of them to paint before long. Have an agreement with your painter whether you or he is to unhang the job and put it together. If the painter is working on the half, it is not his place to unhang or put it together. But if he is working by the day he will probably think it makes no difference, that while he is doing that, he is not doing anything else.

Now is the time of the year to fix your shop for next season. Look it over carefully. Put in more light where needed; fix the old floors, the old runways and old, worn-out elevators. If you have plenty of room, make a good big flat and runway outside. Do these things, and you will not have much trouble with your painter.

In my next article will tell some of the best methods of repainting old buggies, carriages and automobiles; how to start them according to the prices—cheap, medium and good work. If any small horseshoeing and carriage shops wish to know how to start at jobs of painting or what stock to use will be glad to answer same through the medium of "Our Journal." Beware of these one-coat carriage paints—they are the worst thing you can put on your carriage or buggy.



Fitting Shaft Irons is probably the simplest piece of work in carriage building. To get the length of iron, measure from center of shaft bar to tip of shaft with a strip of wood, tin or sheet iron, allowing ½ inch for bending. Now heat iron red hot and use top and bottom horn, or bend with hammer. Have a wet rag or sponge convenient and dampen shaft; then clamp iron at the bar. Hold the top end fast and fit with tongues. Press gently and be careful not to burn the wood. By this method a shaft iron can be fitted perfectly at one heat without [using the hammer. I have seen young smiths work half an hour fitting a shaft iron, and then you could see under it after bolting.

W. H. GUNN, Virginia.

How to Repair Shaft Irons.

R. N. NORTON.

Someone asks about repairing shaft irons. Would say that most of us prefer not to repair them at all. However, the best way is the right way. I always weld a small piece onto the crossbar strip and upset the long one where the weld joins, so they will not draw out too long. Simply heat where you want the weld. Cool the end past all the holes between the weld and the end. Put in vise and upset about ½ inch. Then weld on the short piece, and the long strap will be drawn enough so it will come on the bolts all right, or, if not, there is stock to draw from to make it long enough. Don't be afraid of making the job too good. Charge enough so you can afford to make it good. The quality of the job will be remembered long after the price is forgotten.

Do all kinds of work on above-mentioned plan and you will not have much time for anything but your work. Read good literature, dealing with your business. Read about and study the best ways and make them your ways, and you will be successful every time.

Don't do a job for less than it is worth in order to keep it from someone else. Let the other chap have it if he wants to do it for nothing. You are better off without it. Have some little jobs to do for the few dull minutes that come once in a while. Make a good screw-driver, a tack puller or tack hammer. Someone will want them because they are hand-made. There are a good many things one can do to keep busy, if one looks around to find the job. I make my hammer handles, and now and then a hammer, also make a good many chain hooks, swivel clevises, also swivel hooks and links to use between clevis and plow. I also make other tools for use in logging, but our logging is about finished and will soon be a relic of the past.

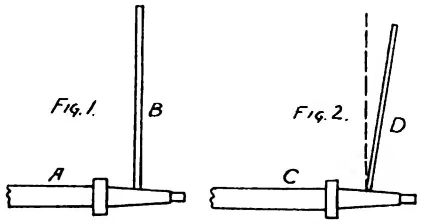
On the Setting of Axles.

W. H. GUNN.

Mr. Van Dorin advises the readers of "Our Journal" not to gather an axle arm. Friend Dorin is mistaken. If a wheel is straight, a slight gather to the front will offset the centrifugal force of its momentum. If a wheel is dished, the gather to the front should be in accord with the principle of a right angle. That is, the wheel gather must come to a square with the axle center plus the momentum, as shown here.

The dotted lines indicate the square, as A, B, No. 1. No. 2, C, D shows a dished wheel, while No. 1 shows a straight wheel. Now, if No. 2 wheel is not adjusted to the dotted line it will bind the nut, because the tendency is to fly off at a tangent. It will not do to confound ordinary spindle wheels of machinery with the wheels of vehicles. And neither will it do to set axles by a gauge, unless all the wheels are precisely alike. Every wheel should run on the principle of a square, just as a ship runs best on an even keel. A plumb spoke or square surface bearing on the bottom of all vehicle wheels is the only scientific way to set axles.

Friend Van Dorin claims that I cannot have a plumb spoke and a dished wheel, too. My critics forget that tenons must be cut parellel with the dish of the wheel if we are to have a square-faced rim (as shown in that engraving), without a "flared tire," shown at top line. Here is an engraving, Fig. 3, with one wheel straight and the other dished. Both are on plumb spoke, as seen by straight edge at bottom, while the center lines of the square demonstrate the right angle theory of setting axles and a flat bearing.



ON THE SETTING OF AXLES

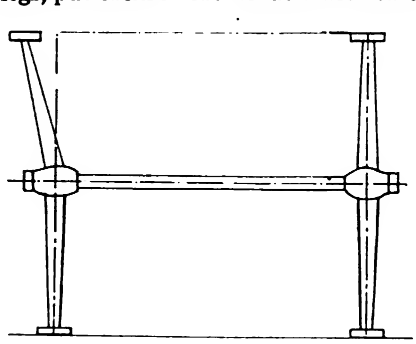
It will be seen here that the dished wheel has more of the indispensable "swing" than the other one, in order to get a plumb spoke. The straight wheel has no "swing."

Little Suggestions for Increasing Smith-Shop Business.

A Collection of Hints—Some New, Some Already Tried—That Can Be Used To Stimulate Business.

L. G. HUTCHINS.

Why the general smith does not use window displays as well as other business merchants do I cannot understand. There are lots of good things in the average shop that would make excellent material for a real good advertising display. If you have a case of shoes in the shop, hang them in the window. Put some kind of a card on the case, naming its value, or place a neat little card in each shoe, telling what that special design is for. If you have any specimens of horses' feet, hoofs and legs, put them in the window with cards



ON THE SETTING OF AXLES

attached, telling what each part represents. If you build wagons or buggies or make a specialty of some particular style of vehicle, get up a set of the iron work, label each part and display it. In short, there is hardly a limit to the displays a general smith can put in a suitable window. Because a window has never been used to advertise a smith shop is no reason why you can't use one. But, when you do use it, don't forget to keep the glass clean.

To stimulate trade and turn it into his shop a Western smith announced a prize potato contest. To the farmer bringing in the five potatoes weighing the most he gave one complete shoeing for any one of his horses.

If you make and sell wagons, buggies and other vehicles, why not sell axle grease, whips, wagon jacks and such things? The man that buys a wagon has need of these other little things, and you can just as well turn the profit on them into your pocket. Ever think of it in that way?

Don't forget the value of a personal call upon those people you want as customers. When you have a special job under way, write them and invite them into the shop to see it. Show them all about the work and why you do it the way you do and why that is the best way. When you get in a new machine, ask your prospective customer to stop in and see it. When you have a few hours of slack time, call on the grocer, the butcher and the other tradesmen and tell them that you want their business and that you can take care of it right.

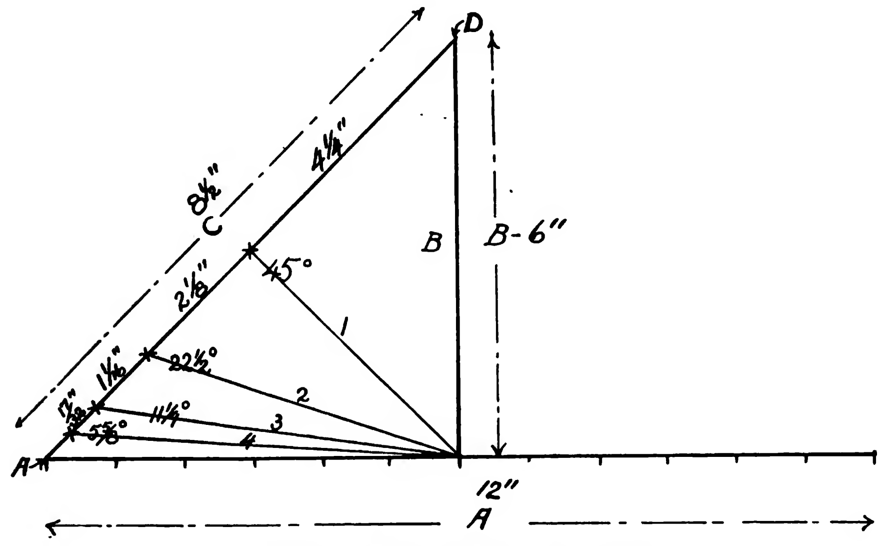
Ever think of using a portable repair shop in enlarging and increasing your business? There's no reason why you cannot rig up an emergency wagon to send out to repair disabled threshing outfits, windmills, pumps and the hundred and one other things used on the farm. If you have a telephone you can repair these jobs quickly and save much time for your customer.

How to Make Polishing Wheels.

A. L. ERICSON.

I do not wish to convey the impression that I think my way of making polishing wheels is the best, but in my seventeen years of experience they have done very good work, and in the spring of the year I keep one man at polishing, steadily.

The first thing necessary in making wheels is to select some boards surfaced on both sides. Poplar lumber is about the best, but there should be no knots or cracks in the boards, and they should be from perfectly dry stock. Take a board 1 inch thick and 12 inches wide and saw it into 12-inch squares. Nail these boards together so the grain of the lumber will cross in each succeeding board. Five boards nailed together in this way will make a wheel 4 inches



ANOTHER PLAN FOR LAYING OUT ANGLES

thick, as surfaced boards are only about 13/16 of an inch thick. Now lay out a center on the boards, and bore a hole ⅜ or ½ inch larger than the emery wheel mandrill. Lay the wheel down on a flat board and make a round, wooden plug, slightly smaller than the mandril on the wheel stand. Set this up in the center of the hole and fasten it so it cannot move. Now pour some babbitt or lead around this plug, and take the wheel or block to a lathe and bore out the babbitt, so as to fit the emery mandril.

If you have no lathe, make a thin sheet-iron bushing and place this in the hole instead of the babbitting. The reason for thus bushing the wood is that the hole would in time get too large for the mandril and cause the wheel to run out of true. After the hole is prepared, slip the wheel onto the mandril and turn up with a wooden gouge or, if a lathe is handy, take the mandril out of the emery stand and place mandril and wheel between the centers of the lathe, and the turning will then be an easy matter.

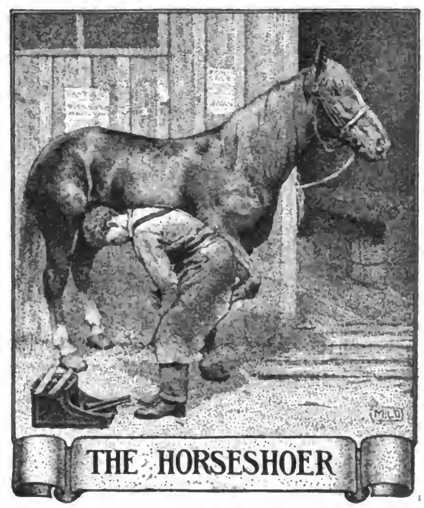
The wheel for plows should be turned, crowning in the center, as it will then conform to plow-shape better. After this turning is done, get some 4 or 6-ply canvas belting and nail onto the wheel face with sixpenny common nails. It should be nailed close, with nails not more than an inch apart. Now boil some glue about as thick as cream, and with a paint brush give the canvas an ample coat. Roll the wheel in emery which has been placed on a board, or a long box can be made, about 2 feet long, 6 inches wide and 2 inches high, an old spoke put through the hole, one hand placed on each side of spoke, and wheel pushed into emery and rolled until it is covered evenly. It should then be taken to the anvil, and the emery rolled into the glue by rolling back and forth on the face of the anvil. Let it dry from 12 to 24 hours, and it is then ready for use. The emery and glue will stick better to the belting after it has been coated a few times.

Before re-covering used wheels it may be necessary to put in a few nails, in case the belt should be loose or show any signs of coming loose. Also remove the emery from the wheel, if there should be some on one side. Otherwise the wheel will be out of balance and will not run well. Number 50 emery is about the right grade for this part of the country, but if fine polish is wanted, 60 or 80 will make a smoother job. I have used Number 46. The coarser emery one can use, the more cutting there seems to be to it and the longer the wheels will stay covered. If one has much plow work, six or ten wheels should be used, and for small shovels I have wheels 8 inches in diameter. Get coach glue from your jobber and soak it first. A good liquid glue is on the market, but it will cost about three times as much as home-boiled glue.

Finding the Degrees of an Angle.

C. W. METCALF.

In reply to Mr. Louis Ferrell's article in the September issue on Page 303, in which he speaks of "dividing the circle," I should call it finding the desired number of degrees. His plan is a good one and all O. K., but I think it would be rather puzzling for some of our beginners. Mr. Ferrell says that if anyone has an easier way than his he would like to see it, so I am giving a sketch of my plan of finding the proper degree. I draw a base line, A, to work from. To illustrate it I will make this line 12 inches long, marking the center at 6 inches. Draw line B 6 inches long, at right angles to line A. Then draw line C from point A to outer point of line B at D, which is 8½ inches long. Now you are ready to find your degrees. Take one half the distance from point A and D, which is 4¼ inches, and draw line 1, as shown in sketch. This line gives you a 45-degree with the base line. Next, take one half the distance down on the 2⅛-inch line. This line, 2, gives you 22½ degrees. Now divide again by half and you make a mark 1 1/16 inch down from where line 2 joins line C. This gives 11¼ degrees. Now divide again, drawing line 4 just 17/32 of an inch from line 3, giving you 5⅝ degrees. I think this is a much better plan than the circle, for it gives the worker a straight line for his measurements and is much easier for a beginner. I would like to hear what Brother Ferrell has to say about my plan.



The Prayer of a Horse.

Mr. Fred L. Rowe, of New York State, writes: "Enclosed find a clipping which I think should be framed and given a prominent place in every shop, so that every owner of a horse may read it":

THE PRAYER OF A HORSE.

"To thee, my master, I offer my request. Feed me, water and care for me, and when the day's work is done provide me with shelter, a clean, dry bed and a stall wide enough for me to lie down in comfort. Talk to me. Your voice often means as much to me as the reins. Pet me sometimes, that I may serve you the more gladly and learn to love you. Do not jerk the reins and do not whip me when going up hill. Never strike, beat or kick me when I do not understand what you mean, but give me a chance to understand you. Watch me, and if I fail to do your bidding see

if something is not wrong with my harness or feet. Examine my teeth when I do not eat—I may have an ulcerated tooth, and that, you know, is very painful. Do not tie my head in an unnatural position or take away my best defence against flies and mosquitoes by cutting off my tail. And, finally, my dear master, when my useful strength is gone, do not turn me out to starve or freeze or sell me to some cruel owner to be slowly tortured and starved to death; but do thou, my master, take my life in the kindest way, and your God will reward you here and hereafter. You may not consider me irreverent if I ask this in the name of Him Who was born in a stable."

A copy of the above, we understand, has, at the direction of Acting Police Commissioner Burgher, in New York, been ordered posted in every stable where police horses are kept.

Two More "Oldest Horses."

ONTRO LEHMAN.

The engraving shows what I believe to be the oldest horse living. Jerry, this fifty-one-year-old horse, is the property of Mr. John Unhru, of City Line, Mt. Airy. He was bought by Mr. Unhru from Mr. Jerry Lasaleer in Jenkingtown, Montgomery County, in 1863. His age at that time was four years. He has worked steadily for Mr. Unhru ever since. This horse has been examined by several of the leading veterinaries of this city, and each one has been astonished. His teeth are wonderfully preserved, but those who have examined him have not the slightest doubt about his great age. On the 10th of August, 1910, his fifty-second birthday, he, with his mate, a young horse of twenty-five, ploughed 1½ acres of ground. On the following day he was brought to my shop to have a new set of shoes put on. Mr. Unhru takes the best of care of his horses and has them tended to at the shop at least once a month. I have been shoeing this horse for the last five years and think I have good reason to claim that I shoe the oldest horse living.

Mr. Unhru is seen holding the horse. The picture was taken in front of my shop, and my son and I are standing on the right.

JERRY, A VETERAN OF FIFTY-ONE

ANOTHER HORSE OF GREAT AGE

WM. RYAN.

Messrs. Beck & Cole, of California, want to hear about the oldest horse in existence. Here is the picture of old gray Tom. I nailed his first shoes on in 1879, and his last shoes I nailed on about a month ago. Old Tom, as he is known, takes Mr. and Mrs. Hooker, his owners, to Paris, which is nine miles from their home, without a balk or an attempt to run away. He makes better time than some autos I have seen. Old Tom has never pulled in and has never been in a garage for repairs.

I have been blacksmithing in the same shop since March 1, 1875, and will send in more in my next letter. I send my respects to all the "Iron Pounders."

P. S.—This Tom was not named after Tom Tardy.

Two Cases of Interfering.

LESTER W. SIMS.

Brothers Mountain and Smith mention each a case of interfering. Mr. Mountain mentioning a case where the horse interferes between the fetlock and knee of the forward feet. Mr. Smith explains his case as a base-wide or toe-wide standing position of the front feet. He says: "The horse interferes and steps on the outside wall first.'

The chances are that both animals are brushing with the hoof at a point toward the inside toe. This may be ascertained in various ways. The simplest way, however, is to take up the foot, allowing the ankle to lie loosely in the hand until the tendons are relaxed. Then move the leg forward in its natural passing position. The toe will drop in and mark the point with which he brushes.

The accompanying engraving shows a shoe which I suggest. Where the shoe is straight at the inside toe, the hoof is to extend over the shoe, and it should be rounded down to the shoe at this point.

In the case described by Mr. Smith a common machine shoe can be used by lapping the inside heel back. Then edge it up well lengthwise with that branch of the shoe, no other calks to be used. As this horse's ankles drop in, he needs raising at the inside heel to straighten up the column of bones above the foot. Now take a heat on the inside of the shoe and hammer the crease, also straighten it back, saving the two last nail holes on the inside. Now round it off well with the hot rasp, leaving the inside toe of the shoe straight, so the hoof will extend at inside toe, as in engraving. In dressing the feet, lower the outside.

Training the Colt.

PROF. JESSE BEERY.

No subject is of more vital interest to the farmer than that pertaining to horses, and no phase of the general subject is more important than the proper training of the colt.

At the present price of horses, the

greatest investment the farmer must make is that to secure horse power. The present outlook is that not for many years will this expense decrease, and the probabilities are that the horses will increase in price rather than decrease.

There are but two ways to counteract this expense. One is to increase the ability of the horse, and the other is to increase the length of the time of service.

The better a horse is trained, and the closer the understanding that exists between the horse and the driver, the greater will be the amount of work that a horse can do and, as the friction lessens, the longer will be the working life of both horse and man.

The average horse broken by the average man does not know how to put its full strength to the work at hand, and often develops a bad temper that limits its usefulness in many ways. Its willfulness causes a loss of time that amounts to many hours in a few months. The irritation caused by the driver lessens his ability to do his best work and, adding a broken implement and now and then a broken vehicle, caused by unsteadiness, lack of control, soon amounts to many dollars.

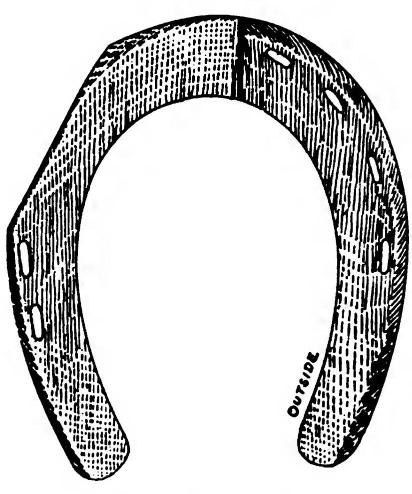
The first requisite in colt training is a good working knowledge of the horse's mind.

There is a tendency among horsemen to attribute to the horse a great amount of intelligence, and in some cases even the power of reason. It is absolutely necessary that this fallacy be eradicated from the mind, if a well trained horse is wanted.

No horse, or any other animal but man, has ever yet indicated any ability to reason. Reason is the ability to proceed from a cause to a conclusion. I desire to consider some acts horses are reported to have done, and show that there are other ways of explaining the horse's actions besides the power to reason.

The first is the old story of horses working pump handles to get a drink of water. Now, if the horse did it by reasoning, it must have thought something like this: "I saw my master working the pump handle up and down and the trough was filled with water. Now, if I work the pump handle the same way, the trough will be filled and I can get a drink."

If you ever get the opportunity, watch his actions and determine whether they indicate any such thoughts. His actions will be about as follows: Many times he will quench his thirst at the same trough, paying no attention to the pump, whatever. Sometimes he comes when the trough is dry and sniffs about for water. He repeats this process many times. He sniffs at the trough, the spout,



A SHOE FOR A CASE OF INTERFERING

The outside branch is convexed to a thin edge on the inside. The inside branch is swelled at the heel from the nail holes and rolled from heavy line at toe.

the top and handle. He nibbles at the trough, the spout, top and handle. He pulls at each. Finally he makes an up-and-down motion on the handle and a tiny stream trickles from the spout. He did not purposely pull the handle up and down, for maybe he had pulled it laterally many times. No one can imply any reason so far, surely. If he has any reasoning power he will now—since he

THE FARMER RAISES OTHER THINGS BESIDE GRAINS AND FRUITS

has succeeded in getting water—repeat the moving of the handle and get water the second time. But, not so, he again sniffs and nibbles, and may be longer reaching the handle the second time than the first. After many trials he finally happens to move the handle just right and receives his drink. He may repeat this round-about process many times until, by chance, he begins at the handle and gets water. Then many times he begins other places before he again begins at the handle and is rewarded. Thus, not by a process of reasoning, but by associating the handle and water by numerous repetitions, did the horse arrive at the process of getting water. Where this one horse formed this habit, thousands of others never formed such a habit.

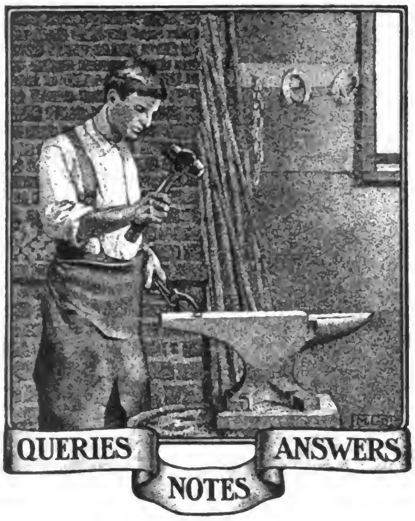
Another feat that is often given as evidence that horses reason is the ability shown by many horses to open gates. Such gates have usually a very simple device or a hook. A horse learns to operate this particular gate just as the horse spoken of above learns to pump. Each reaches the end by accident and fixes the habit only by repetition. The least change in the working of the pump or the gate breaks up the muscular habit the horse has gained, and he must begin over again.

Anyone who believes a horse reasons when it opens a gate will be easily undeceived if he changes the fastening to the other end and then watches the performance of the horse. After he finds the fastening he has the entire process to learn again, simply because the peg pulls out in the opposite direction.

I mention these instances because they are invariably pointed out as the highest indications of reason. Many other such incidents might be mentioned, but the argument that any ability is shown by the horse to go from premise to a definite conclusion is entirely lacking.

The horse in a state of nature remains generation after generation in the same mental condition. Never until he comes into contact with man and receives training from him is there any progress in his mental equipment. Every indication points to the fact that whatever progress he makes comes from without, not by any process of reasoning within. Therefore, it is necessary to bear in mind in training a colt that it will not gain in knowledge unless its training is continued. It stops just where you leave it, except for the accidental impressions made that attach some minor habit.

I have discussed this point somewhat at length, because it is fundamental in training horses. When a man realizes that he is training muscles to certain actions and that through these muscles the brain is trained, then and then only is he fit to develop a horse.



Wants to Bend Wood.—I would like some information on timber bending, and trust that some kind brother will favor me.

W. A. JUBY, S. Africa.

Information on Copper.—I would like some information on the hardening of copper—the process complete; also on brass, both hard and soft.

PROF. C. SHERWOOD, Maryland.

Tempering Stone Hammers.—I would like to hear from some brother smith on the making and tempering of an eight-pound hammer and also a mason's bushing hammer. I also want to know about making and tempering stone axes with and without teeth and also stone picks.

J. M., New York.

A Question on Interfering.—I am shoeing a mare—a very nice roadster. She has a nice, clean gait, but when she is driven out of her natural gait, she strikes in front about half way between her ankle and knee, and behind quite well back on her ankle. Would some brother kindly inform me through our paper of some method of shoeing that will prevent such striking?

L. C. BOYES, Washington.

Wants to Temper Grubbers.—I wish to ask through the paper the proper way to temper grubbers. I make grubbers 8 inches and 10 inches wide, all cast steel, except the eye. They are of the thickness of an ordinary spade. Some of them crack in the tempering. Could someone that knows exactly how to temper spades advise me, as I believe the same temper would be suitable for both. C. FORNO, New Zealand.

A Power Shop of Iowa.—I have a good brick shop, 28 by 70, and a wood shop, 22 by 40, and my lot is pretty well covered. I run three fires and am pretty well equipped with good, modern tools. I have a six-horsepower Fairbanks Morse Engine for power, and run nearly everything by power. I get fairly good prices here, but not so high as they are in some parts of the country. I do all kinds of work—shoeing, plow and wagon work and machine work.

W. H. BALL, Iowa.

Cold-Tire Setter Experience.—I will give Brother Frank Hawkins, of Kansas, my experience with cold tire setters. I have used three machines. My first machine I did not like at all. Next I got a No. 2 Brooks, and I exchanged this for a No. 4 Brooks, and this is a dandy. I can do more work with it in one hour than any man can in half a day using the old method, and I can do it better. My advice to the brother is to get a No. 4 Brooks and he will have a machine that will do the work quickly and well.

A. T. WRIGHT, Texas.

A Kentucky Price List.—I have been in blacksmith business for over twenty years, and am doing a good business. My shop is thirty by forty-five feet, and contains two forges and a good set of tools. A few prices on my work are:

Horseshoeing, plain	$ 1.00
Horseshoe, toed shoes	1.25
Buggy tire setting	1.60
Wagon tire, two inches	2.00
Wagon tongues	2.00
Front hounds	2.50
Bolster, front	1.50
Rubber tires, ⅞-inch, per set	16.00
Channel tires, per set	5.00
Flat tires, per set	4.50

All my other work is in proportion to the above. R. E. VEATCH, Kentucky.

A List of Questions.—I would like to submit the following questions to readers of "Our Journal:" 1. How can you prevent the scaling of an engraved die when hardening it? 2. Would like to know how Bert Hillyer, of New Jersey, makes a crucible tongs under the steam hammer—pot 15 inches by 20 inches high. I want to know what stock he uses and an explanation of each step. 3. How are rolls hardened to prevent cracking? The rolls themselves are 6 inches in diameter and 10 inches long, while at each is a piece 2¾ inches long and 2½ inches in diameter. 4. How are square chain links welded? 5. How is the forging in the engraving at A made out of ½-inch rod stock—the 3-inch ring is welded in the ⅝-inch eye? 6. How would you make the forging at B from 1¾ by 5/16-inch stock? 7. How is the gravity hinge at C made? It is patterned after a cellar-door hinge, only the part that holds the bolt is cut at an angle, so the door will close itself, and that piece that goes on the door casing is riveted to a plate.

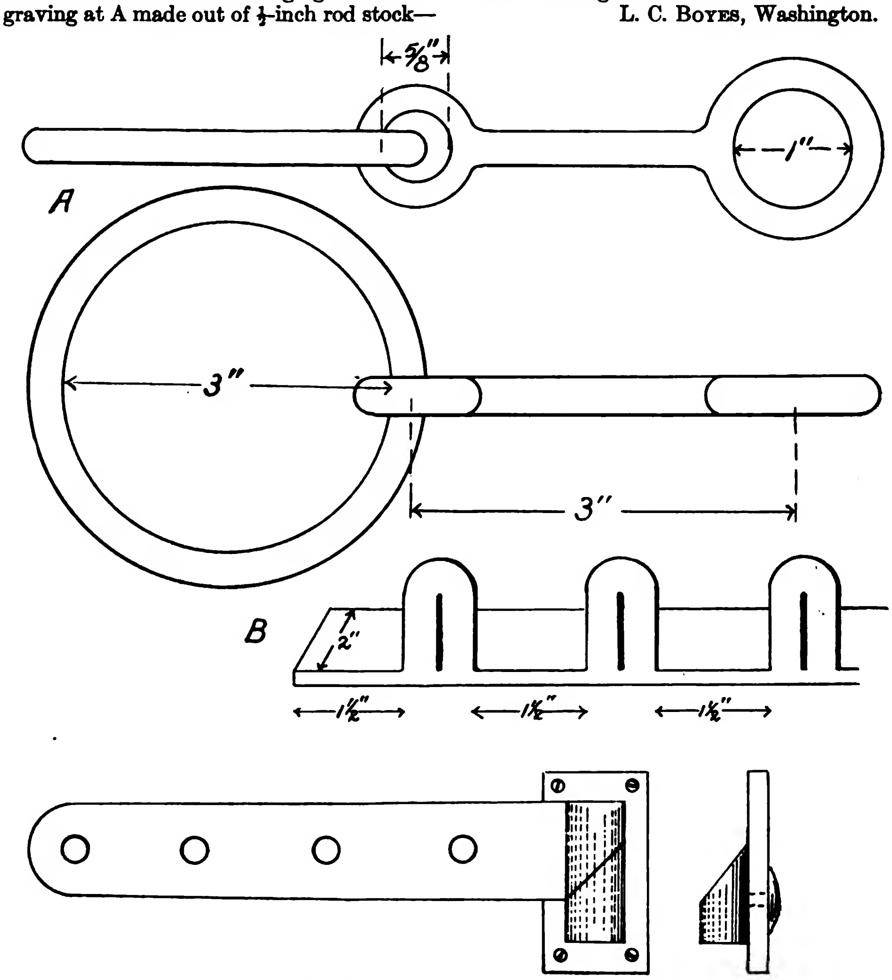
QUESTIONER, Ohio.

Tire Work in Australia.—I take particular interest in matters relating to tireing and shoeing. We get a great variety of tires from the buggy to the large wagon tires, ranging from 6 feet high to 7 feet and from 5 inches to 6 inches by 1¼ inches thick. We weld straight up in coke fire, setting on two bars of iron to prevent sinking too low in fire and fire bricks on top, and weld in D. M. L. tire upsetter. We cut edges of tires on a short bevel to form a scarf, as it shoves up on the machine.

VULCAN, COOLGARDIE GOLDFIELDS, West Australia.

Removing Broken Spoke Ends.—A handy device for removing spokes from the wheel if they are broken off close is to take a ⅞ or 1-inch turn buckle and a ⅝-inch lag screw; weld about 16 inches on the lag screw and then weld on a square head, large enough to prevent dropping through turn buckle. Use a ½-inch bit and bore into the stub of spoke; insert your lag screw through turn buckle, take a wrench and turn the lag screw into the ½-inch hole. Use the turn buckle as a jar on the head of the lag screw. This method will be found much easier than chiseling the stubs out.

L. C. BOYES, Washington.



HOW WOULD YOU DO THESE JOBS?

A General Power Shop.—The accompanying engraving shows my shop. It is furnished with a 4-horsepower gasoline engine, 1 circle saw table, 1 jointer, 1 jig saw and 1 emery wheel. I have also a 16-foot line shaft, a No. 400 blower and two forges. Size of blacksmith department is 50 by 24; wood shop, 24 by 39.

A CONCRETE SHOP OF SOUTH DAKOTA

My shop is located in the heart of the business district. We have a large State Normal School and one high school. The State Normal School, in sight of the shop, has over 500 students. The population is 2,000. A pretty little place, with a splendid park and fairgrounds.

C. E. MILLER, Pennsylvania.

Says They Are Impossible.—I like the paper very much and consider it a great help to me in many ways. I have obtained many useful pieces of information from it and always look forward to each issue. There are some among those writing for it inclined to talk. Some of them say almost impossible things—such as cutting a left-hand thread with a right-hand tap. I have about the average amount of brains, but I cannot do that. Another smith can cut an inch and a half of thread with an inch tap. This is too much for me. On the other hand, there must be some expert tradesmen writing for the paper, as their articles are really to the point. They tell what they do and the manner in which they do it. I enjoy their articles very much. C. FORNO, New Zealand.

In Defense of the Country Shop.—In the August journal, Mr. C. C. Donnell, of Texas, spoke in a slighting manner of the country shops. I take pleasure in sending the picture of my shop, so Mr. C. C. Donnell will have something to look at. There are better shops and blacksmiths out in the country and in towns than there are in the city.

Here are some of my prices:

Old Shoes, set of four	$1.00
New Shoes, set of four	2.00
Never Slips (per team)	5.00
New Wagon Tongues (wood only)	3.00
New Tongues, complete	5.00
Wagon Rims	$1.25 and up
New Bolter	2.00 and up
Spokes	.20 to $ .30
New Plow Share, 14 inches	4.00
New Plow Share, 16 inches	4.25
New Plow Share, 18 inches	4.50
Tire Setting	$.50 to $.65 per tire

J. G. JOHNSON, South Dakota.

A Well-Equipped Power Shop.—Our shop is 30 by 60 feet and located in a rich country town in a good farming and apple section. We have a six-horse gasoline engine, a planer, a jointer, a rip saw, a band saw, a cut-off saw, a boring machine, a lathe, a drill press, an emery wheel and a blower. All of these machines are run by power. Then, too, we have the following hand tools: a tire shrinker for heavy work and another for light work, a Little Giant punch and shear, a Green River foot vise and bolt header, a Reynolds tire bolting machine, a boxing machine and a spoke tenoner.

Our prices are not as good as in some parts of the county and as we have no organization here it is hard to raise the prices. I get $1.00 for four regular shoes; $1.20 for setting four buggy tires; Wagon axles, $1.00 per inch; hounds, $1.00 per inch; tongues, $2.00 to $4.00; Wagon spokes, $0.25; Short felloes, $0.25 to $0.60, and all other work in proportion to the above prices.

As I think myself a better reader than a writer I will stop now and read some brother smith's letters, for I enjoy reading them very much.

WM. P. WEIKERT, Pennsylvania.

Scotland's Champion Shoer.—Herewith is a clipping from the "Weekly News." I thought all the smart men were in America, so the statement may interest the readers of "Our Paper," which I may say I like very well. I take no responsibility for the facts of the statement below, but send it on its own merit:

A challenge of the claim of Mr. Alexander Allan, of Eaglesham, to be considered the champion horseshoer of Scotland, is made by a correspondent. In the village of Dulnain Bridge, he writes, there lives Donald Laing, who has a great record. This stalwart made fifty-two pairs and a half a shoe in three hours. Made one hundred pairs and fitted four new shoes on a horse, sharpened a crow bar, put two links in a chain—all in eight hours twenty minutes; removed and sharpened and drove on four shoes in eight minutes; removed old shoes, fitted and drove on new set of shoes and dressed feet in twenty minutes. These are some horseshoeing records to which may be added a championship as a plough maker. Mr. Laing holding several medals for this branch of the trade.

Although the work referred to was done some fifteen years ago, Laing is still open to repeat the performance and go one better if required. JOHN BEATTIE, Scotland.

An Interesting Talk from South Africa.—I have been reading your paper for over three years and find some very good things in it and agree with most of them. Of course, we have not the same work to do here as you have in the United States.

Mr. Harry G. Bell says that cow dung is far from satisfactory for heating tires. I have been using sheep dung for eight years and find it gives better results than any fuel I have used for heating tires on the ground. That is, dung dug out of the kraals. I think I should prefer it to what I have heard of furnaces, though I have never seen or used them.

The largest tires we put on here are 3 by ⅞ inches and 5 feet high. I get them white hot all round with sheep dung and give them 2¼-inch draw for new wheels.

In regard to Mr. Phifer shoeing horses or mules without a rope I do not see how he can do it. I have been shoeing for ten years, and I often have to use a rope, though I have never hit a horse with a hammer, rasp or whip, neither have I ever had one that I could not shoe.

A POWER SHOP OF PENNSYLVANIA, DOING GENERAL WORK

If Mr. F. J. Casey will put a ring in his floor for wild horses and rope them to that by a rope over the neck (not by the halter rope), and have someone holding the halter rope, I think he would get better results than from a ring in the wall.

I find that one ounce of chlorodyne in a quart of water is very good for horses with gripes.

For greasy heels I use Patent Anti-Friction Grease, manufactured by D. Storer & Sons, London, England. The heel must be well washed and dried and the grease rubbed well in. Mr. H. W. Rose might try these methods.

W. R. FITZPATRICK, Cape Colony.

A Canadian Power Shop.—The accompanying engraving shows an exterior view of my shop. My equipment is run by a 15-horsepower I. H. C. Engine. I run a grain grinder two days a week, as a side-line, and have the agency for McCormick implements. I also handle binder twine and oils. Business is good, but prices might be better.

GEORGE A. TUFTS, Ontario.

I would like to state also that prices are fair and I have plenty of work for me and my man. We have a 50-pound Myers power hammer, which is a dandy, a 6-horsepower Weber engine, a power drill and power blowers.

D. AHUTHOLZ, Iowa.

Says All Setters Good.—I am no writer, but will try and write a few lines. Brother Hawkins, of Kansas, gives a good talk on good tools. I think if there is any class of workmen who deserve good tools with which to work that class is the smiths. I notice that Mr. Hawkins is interested in cold tire setting. It does not seem to me that any good smith would get stumped on this subject. Any smith knows that cold iron can be pushed together. I can tell you why there are not more cold tire setters in use at present. In the first place there are hundreds of men who have never seen a cold-tire setter at work. Secondly, there are thousands of smiths in the world who have a set of tools that cost only about $75.00 or $100.00. A cold setter costs more than all their tools put together. They think it is too much to invest in a little machine.

AN ONTARIO POWER SHOP, CARRYING SEVERAL SIDE-LINES

More On the Cold-Tire Machine Discussion.—I have a House cold tire setter, which I have been using for five years. It paid me good money the first four years, and the fifth year, being a dry season, we set nearly seven hundred tires, at $ .50 each. Not one of my customers has anything against them, with the exception of one man who has never time to wait till he gets them set hot. One man can set a buggy tire (one that is very loose) in about eight or ten minutes, after the spokes are wedged up. A wagon tire that is very loose can be set up by one man in fifteen minutes. I get enough tire setting to do in my territory to pay the interest twice over on a cold-tire setter, if there were any to pay. My machine is just as good today as when it was bought.

A man doesn't want to take too big a bite or it is apt to kink the tire. About $1\frac{1}{2}$ inches or 2 inches is sufficient. He should also be careful not to shrink it too much in one place—$\frac{3}{16}$ to $\frac{1}{4}$ inch on a buggy tire, and $\frac{1}{4}$ to $\frac{1}{2}$ inch on a wagon tire. This is all the tire will stand when it isn't tight. The tire can then be gripped at a new place.

Cold-tire setting is a success, no matter what some say about it. I set about twenty tires cold before I really grasped the trick of doing it. You need not take the bolts out of the wheel if you operate the machine in the proper manner. I broke one casting after I had my machine two years, and the company furnished a new part, free.

I have seen the House machine at work and also the Mayers, and they do the work O. K. I own a Mayer—it is my preference—but they are all guaranteed to do the work. I believe I can set hot tires with any man, but I can set a tire and put the wheel in good shape with a Brooks machine. This I could not do in hot setting.

If any man will get a cold set and use his brains the machine will do just what it is claimed it will do. If Brother Hawkins will only stop in at the factory at Wichita, Kans., the makers can easily show him.

My son and I can weld and put on a set of new wagon tires in one hour and fifteen minutes. No wood to chop, no oil to start the fire, no burnt rims, no guess about the dish (quit when get it right)—I cannot say how many tires I could set in a day. I have set old tires and placed them back on the wagon in twenty minutes. I find that a tire put on with the machine stays tight longer than one put on hot. My machine is a trade-getter. People will come because the machine is so much quicker and better, and oftentimes they will have other jobs at the same time.

C. F. CRABTREE, Missouri.

Questions on Skeins and Plows.—I should like instructions as to putting new skeins and boxes on old wagons—I mean on the ordinary heavy, two-horse wagon. Would be glad to have instructions on the job from beginning to end. Also, what is the best method of resetting an old skein which has become loose on the axle. There is one kind of wagon sold here upon which the skeins invariably become loose after about two years' service. I have reset several of them—some successfully and some unsuccessfully. I am anxious to know the best way to do this job.

I should like further explanation of the different methods of hardening plows, such as turning plow shares, lister shares, sweeps and shovels. Would be glad to know the best plan for doing this and the whys and wherefores of the subject.

I have seen one smith, who is considered an expert, hammer a share out—of course using several heats—then finishing with file or stone and, without further heating, grasp the share on the sharp side with tongs and drop quickly in the water (sharp edge up). The plan I follow is this: After finishing the sharpening, replace share in fire and heat evenly along the cutting edge to almost a cherry red; then dip edge only in the water; remove for a short time, just long enough to let the light colors run off, then cool. This plan works successfully on some plows and on some it does not. For instance, I sometimes get shares which I sharpen two or three times before I get them hard enough, and maybe have to cool with white streak on edge to do so. Now, of course, in the metal is where the difference lies, and I probably need to learn more about the metal. Therefore, I will gladly listen to any information I can get on any side of the question.

I would also like to have a talk on the different kinds of plow steel, i. e., cast steel, crucible steel and the various other kinds used, names of which are given in the catalogue. What is the difference in them and for what purpose is each best suited and why? Are different processes used in welding them? A. W. SENTER, Oklahoma.

A Shop-Made Power Hammer.—I work all alone, except when the boys are not at school. I will not attempt to tell you that I shoe twenty-five or thirty horses per day, but I have shod a good many this winter, doing it well, and getting all the money it was worth. Now, in this old shop of mine, I have a $2\frac{1}{2}$-horsepower gas engine. With it I run the following machinery; a three-foot grindstone, a disk sharpener, an emery and buffer, a rip saw, a two-fire blower, a drill, a fan and a trip hammer of my own make. This hammer cost me but sixteen dollars and forty cents, and I am not afraid to put it up against any of them. For the benefit of some neighbor I will endeavor to describe the process of constructing it.

The frame of this hammer is of wood; the bottom three by two feet three inches, oak stock. The post is made of three by $3\frac{1}{2}$-inch oak; the top frame is of three by $3\frac{1}{2}$-inch oak, with a three by fourteen-inch oak board bolted across the two front posts to which the ram is fastened. The ram slide is eight by fourteen inehes of plow steel. The ram, two by three inches, weighs twenty-one pounds, and is of black diamond steel. The anvil bare is twelve by twelve, on an eighteen-inch block. The anvil I used was an old one hundred and nineteen-pound Trenton anvil. I heated it and with a heavy hot chisel cut off both the horn and heel and clamped the body on the block. Then I got a pitman and also a pitman wheel off a windmill, and used a four-leaf buggy spring, reversing it to swing my ram. Next I got a mutiple friction clutch pulley and hung my treadle so that I can stand with both feet on the floor while operating it.

Speaking frankly, a year or two ago I was a knocker when hammers were discussed. Then the idea struck me that I could make one. I did, and now I realize

how much I needed one. I would advise anyone who is without one to make one or buy one, for the man who hammers his plows by hand when he has the means

J.T. Moncla
Scientific Horseshoeing
Gunsmithing
& General Work.

FIG. 1—SHOWING A SIGN MADE UP OF ITALIC CAPITALS AND SMALL LETTERS

to get a power hammer is losing time, energy and the possibility of better work.

G. W. LANCASTER, Kansas.

An Interesting Letter from Texas.—I cannot run my shop without the help of your fine journal. I cannot see how any blacksmith can get along without your paper. I have been a subscriber for the past two or three years and expect to take it as long as I can get hold of a dollar. I am satisfied with the way in which you get up the paper. I think it takes everything that you put into it to make a first-class trade journal. I am very much interested in the Automobile Department, as I think that the automobile repair business belongs to the blacksmith. I also think that the blacksmith should carry a good side line to his business.

I carry for a side line paints, oils, varnish, glass, light hardware and saddlery goods, also a small stock of picture moldings. There is good money in framing pictures. I always look forward to the coming of your good journal as I know there will be a great deal of reading in it. The only thing I do not like about the paper is that it does not come often enough. I think it would be best for the Editor to get out a paper twice a month at least, if not more frequently. I think all of the craft will agree with me on this. I love to read the good letters from the brother smiths of the different states and foreign countries, and their way of doing work. I like to look at the pictures of the shops in the different countries. My shop is 20 feet by 54 feet. I use the front part, 20 by 30, for a forge room. The back part, 20 by 24, for my saddlery, moldings and the balance of my side lines.

I run two forges most of the time and have plenty of tools to do most any kind of work that comes along. There is but very little horseshoeing to be done at this place and I am glad there is no more, as I do not like to shoe. I can always find something else to do that pays better, as shoeing is entirely too cheap here.

J. H. WELLS, Texas.

A Well-Built Kansas Shop.—I moved to Kansas eight years ago, from the State of New York, and put in a few tools and have since kept adding to them, until at present I have a good up-to-date shop. I have a 4-horsepower engine, a 10-foot Barnes iron lathe, Little Giant trip hammer, emery

J. M. Moncla
Scientific Horseshoeing
Gunsmithing
& General Work.

FIG. 2—AN ATTRACTIVE SIGN, USING THE MEDIAEVAL STYLE

wheel, a Champion drill and a Brooks cold tire setter, which I have geared to the engine. I have also a steam vulcanizer and a good many auto repair tools. I am prepared to do all kinds of work—wagon, plow and auto; in fact, anything that comes along. I aim to have the engine do the most of the hard work. My shop is 45 by 50 feet and is built of cement blocks.

A. E. HARDY, Kansas.

Two Shop Signs.—In reply to Mr. J. T. Moncla, of Pennsylvania, I wish to say that I am no sign writer, but I have some good ideas, and that is what Mr. Moncla asked for. He did not state whether he wanted a fancy, showy sign, or just a common, everyday sign, so I have written two, both of which I think good. In No. 1 I have used the Italic capitals and small letters. They should be slanted just a little more than I have them, but I think it a good sign for any ordinary shop. If, however, he wants something a little more showy he can use No. 2—the mediaeval capitals and small letters, and he will have something very showy and hard to beat at any cost. If neither of these will suit his purpose, and he will write me, I will be glad to help him out all I can.

C. W. METCALF, Iowa.

He Has Handled Them All.—It is with some degree of timidity that I attempt to write anything for publication, as I have had a great deal more experience at the forge than "in pushing the pen." I have worked steadily at the forge for twenty-one years and during that time have worked in a great many different places. I have worked for almost all kinds of men and have handled almost all kinds of tools. About three years ago I decided to settle down, and since that time I have bought and paid for seven lots, with a good, seven-room house and a barn on one of them. I have built a shop with 2,000 feet of floor space, including an automobile garage, and have at present a business that averages about $2,750 annually. Now I am coming to the cause of all this preliminary: Brother Frank G. Hawkins' letter in the October issue. I want to say, for the benefit of Brother Hawkins, that I have handled all of the edge-grip cold tire setters that I know of, except one, and I can do all that the manufacturers of the machines claim can be done. But on these machines, as on any other, a man has to use good judgment in placing the wheel as it should be placed, also getting the grip keys the right distance apart, and so on. It takes a man with brains to handle one with any degree of success, as the makers could not put brains in their machines. It seems to me that any man that would use good, common judgment could take any of the edge-grip machines and do better work than by setting tires hot. Now, Brother, do not understand me to say that I can do woodwork with a cold tire setter any more than you can by the old hot shrinking or cutting and welding process. But take the same amount of time and work on the wood part of the wheel that you would if setting hot, and then you can set the tire cold in an eighth of the time and with more accuracy, as no man can tell just how much draw a wheel will stand without dishing, but by setting cold you can watch your wheel and, when it begins to give or draw, you can stop.

THIS SMITH HAS TAKEN UP AUTOMOBILE WORK

If Mr. Hawkins will write me I will tell him what machines I have used and also what machine I now have and why. With best wishes to the craft collectively and individually, and also to THE AMERICAN BLACKSMITH, I am one of the boys ready to be reproved or approved.

J. N. RUSSELL, Texas.

Cold Setters on Trial.—As I am a reader of your journal, I cannot help saying a few words about cold tire setting. Frank G. Hawkins, of Kansas, wants to be shown—so do I—but I am testing a machine at present, the company having placed a machine in my shop on trial, giving me plenty of time to test it. I must say cold shrinkage, in my opinion, is not practical. Cold stoving of iron does not look right to me, but our customers seem to want it, so I, for one, say let them have it. I have been in the smithing business for twenty-two years in different places.

Make them show you—they will do it; that is. some of them will (I mean the manufacturers of cold setters). My one objection to cold tire setting is the kinking of the tire, which seems to be a feature in cold setting. I call it cold kinking. Cold setting in summer, I think, would do better than in winter. I have an idea if we would cold stove—or shrink—a tire that had frost in it, something might pop, but, of course, we do not set as many tires in winter as in summer.

In regard to the saving of labor I must say that I can set four to one with the cold setter. I want to say to Mr. Frank G. Hawkins, if he wants to get the best (to my knowledge), he can have one placed in his shop on trial for from three to six months, under contract—he to pay the freight to his place. If not satisfactory he can return it to its maker. The Mayers people will do that. It looks to me as if we must have the cold tire setter, and I say let us have the best. If we find a company that will place a machine on six months' trial they are surely the ones to do business with. It seems to me that a company that will not place a setter on trial might be doubtful of the final outcome, and have some doubt in their own minds about their machines doing satisfactory work.

RICHARD LOADES, Kansas.

"Those Fifty Lister Lays."—In reply to Mr. H. B. Jewett, of Nebraska, Mr. Jewett says that the Lord furnishes the hot air for Nebraska, while in Iowa the blacksmith seems to be responsible for it. Well, Mr. Jewett, I thank the Lord for giving the Iowa smiths that much more power than the Nebraskans, so that we are able to furnish our own hot air.

I stated in my last reply that I had worked against the best smith in Nebraska. Now Mr. Jewett says that, "As I have not seen them all, it might have been the poorest of them,'' and then he goes on to say that he had the same opinion of himself at one time, but finally awoke to find that he was alone in his belief. I would like to tell Mr. Jewett that I have never found myself in that part of the ship. He also says that he later on found that there were some could give him cards and spades at the business, but he doesn't say which came out best. He proceeds to say that Brother C. W. M. desires to know what manner of shape the lister would be in to be heated hot to be drawn on two heats, and I repeat it, I surely would like to know. Mr. Jewett thinks the desire for this piece of information sounds more like a peanut roaster than like a master workman in the art of smithing. I would like to say, Brother Jewett, that the "fifty lister lays'' have always seemed to me more of a peanut roaster than anything else. He, however, asks if there is any reason why a man cannot draw out 18 or 20 inches at one heat and leave it in the same shape as if he had but 6 inches to draw. A trip hammer is—Oh, yes! the trip hammer! Here is the point he has left hidden all the time, and our Kansas brother left out when he told of his big day's work. A man would naturally think by the way he wrote that it was done with a hand hammer and on the anvil.

Brother Jewett makes light of my statement of having a customer bring his work seventy-three miles to have me do it, and he mentions that there was a man who moved to Salt Lake City, Utah, and still continued to send to him to have his wrenches, chisels and punches made, but it was not because there were no good workmen there, but because he owed the man a small account. I am glad to say it was not so in my case; it was quantity and quality. He advises me to come out West and look over the situation and see some of the up-to-date shops, where they do work while you wait. Thanks, Brother Jewett, for the invitation. I notice that they have shops in Nebraska 180 by 100. I think they will have to build on some additions in order to compete with Iowa. I have worked in shops in Iowa with over 21,800 feet of floor space. The accompanying engraving will show Brother Jewett the man with whom he has been discussing the fifty lister lays.

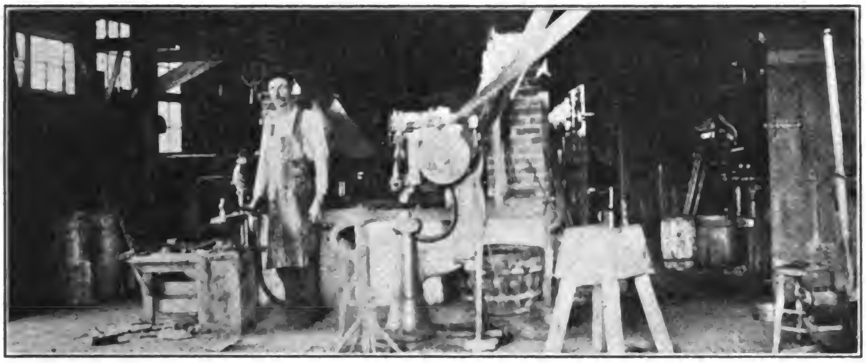
C. W. METCALF, Iowa.

MR. C. W. METCALF, OF IOWA

A Talk on Tire Setting. I have been at the trade since October 1, 1868, when I started to learn the woodworking or wagon-making trade, and worked at it until April 1, 1875. In the spring of 1875 the firm of J. and H. C. Deible built a wagon and blacksmith shop, 40 feet by 60 feet, two stories high, and a store-room 20 feet by 60 feet, one story high, in a new town in a good coal and lumber country, and since then to the present time we have both been working in that identical shop; J. Deible at woodworking and painting, and H. C. Deible mostly at blacksmithing. We were both woodworkers when we started, so I took up the smithing end of it. We build farm and lumber wagons and delivery wagons, and do all kinds of repairing, but we do no horseshoeing. In the thirty-five years that we have been in business here, we have never made less than twenty-five new wagons, and have made as high as sixty in a year. We have always been able to sell all of our wagons at retail prices, and we make them up in lots of from six to twelve at a time. We often dress out gear stuff for twenty-five to forty wagons at one time, and we hardly ever make less than six sets of wheels at a time. It is the same with boxes or beds—we find we get along much faster by making them in lots of six or more than we can by making them one at a time.

I would like to give the readers of THE AMERICAN BLACKSMITH my way of setting tires. We hardly ever set less than three sets at a time—from three to six, and mainly four. That makes a nice day's work for a smith and helper. To begin with, we lay the four sets of tires on the floor, side by side, run a wheel over front and hind to get length, add three times the thickness of tire, cut off, straighten edgewise, and run through bender. I am always very careful to get them bent round and true. Now I take my tire wheel or traveler and run all the wheels, and mark them hind and front from one to eight, and also mark the size of each wheel and the number on the tire wheel. Our tire wheel is made of a small circular saw; the handle is of wood with slot sawed into one end with fine rip saw,

A GENERAL SHOP IN KANSAS, RUN BY MR. R. LOADES



MR. Z. T. CLOVER RUNS THREE FIRES IN HIS OHIO SHOP

and riveted through center of wheel, so that it runs perfectly true. The engraving shows the tire wheel. In the measurements, No. 1 is a groove made with a fine file, and is the starting point; No. 2 is front wheel measurements, and No. 3 hind wheel measurements. Now we are ready to begin welding tire. The wheels are all run and set out near the tire stone, No. 1 first, then No. 2, and so on up to No. 8. First, I true up the ends, then turn tire and mark exact length. Then I heat, cut off, scarf and weld. When the tires are all welded, I lay them down to heat on a foundation of heavy irons, so that they rest in four places. I build a good fire and heat them hot enough to cause them to drop on easily, without hammering or sledging. Then we life them out of the fire with long-handled tongs, drop them on wheels and cool them, using hose and city water for the cooling. I give heavy wagon tires, such as $1\frac{5}{8}$ inches by $\frac{5}{8}$ inches, or $1\frac{3}{4}$ inches by $\frac{3}{4}$ inches, from $\frac{3}{16}$ to $\frac{1}{4}$-inch draw. That, with heat from welding, makes $\frac{3}{8}$ to $\frac{7}{16}$ of an inch draw. I have no trouble in giving new wheels the proper dish. We give heavy wheels from $\frac{1}{2}$ to $\frac{5}{8}$-inch dish. We use $\frac{1}{2}$-inch Stayer hubs. I believe that I set more than one hundred sets of tires, new and old, each year for thirty-five years.

H. C. Deible, Pennsylvania.

Free Trade Schools.—I was pleased to see that you published my two letters in a recent number, also the article by W H. Dooley on trade schools in Switzerland and by James L. A. Burrell on trade schools in Germany. No doubt these articles will raise a storm of protest from some quarters, but never mind—The American Blacksmith is not going to be a back number. Make it famous, notoriously so or otherwise, I would say,—but then, I am a kicker, and like the useful mule I come of kicking stock, and we won't get anything without kicking. So come on, boys, let us get on the top of the heap. Remember that we make our living by making a noise. I am going to strike again while the iron is hot and make you another suggestion. In the first place let every one of you subscribe for The American Blacksmith. It costs one dollar per year. You can easily save that amount if you will do without a few theater tickets or cigars or perhaps some of you are in the habit of taking a glass of beer. Well, cut that out and subscribe for The American Blacksmith.

Then let every one of you write your ideas for publication. Don't be afraid to swamp the Editor. Remember this paper is what you make it and it is up to you.

Write to William H. Taft, at Washington, D. C., and to the Congressman from your district at Washington, D. C., and demand—don't beg,—demand that they use their influence to get an appropriation for a free government trade school. Don't forget to make it free. It is for the boys, the "have-nots." Tell those gentlemen that if they don't represent you and get what you want, you will take care of them next election. Tell them that the President's salary was raised to $75,000 per year: that there are millions squandered on the army and navy which fail to pay: that there have been billions looted from the Treasury in the last fifty years and here is the list of official figures;

Pacific Railway debts	(page 32)	$ 70,000,000
Discrepancies in six reports	(" 32)	93,000,000
Further discrepancies	(" 32)	331,409.634
Missing warrants—1869—	(page 34)	$ 400,000,000
Bond sales disappeared—1879—	(" 38)	1,720,677
Overcharge on pensions	(" 42)	12,000,000
Scratched (Fraudulent) warrants	(" 42)	230,000,000
Pacific Railway steals	(" 53)	58,638,320
Warrants disappeared	(" 36)	1,387,969,962
Total		$2,584,738,593

Tell them you want them to make an effort to recover this money and build free trade schools; that there was $122,662,485 spent on the navy in 1908–9 and $38,994,075 for armament and destruction. In the event of war, the people who will benefit the most will make their escapes to Europe. It will be a rich man's war and a poor man's fight, and if we have those trade schools we will at least have something to fight for. Tell your man that if we do not get what we want we will put someone in office next election who will do something for us.

So now, boys, do not be afraid to subscribe for The American Blacksmith. Send a dollar and write to the Editor. Snow him under if you can. Some of the bosses and shop owners may knock the idea because they want your labor for nothing, but then, they are in the minority, and you certainly need the schools. So don't be chumps.

E. Z. Mark, California.

An Ohio General Shop.—The accompanying engravings show an interior and also an exterior view of my shop. I do all kinds of work, and have power to help. I have three fires and run two by power. I also have a lathe, a jig saw, an emery grinder, a rip saw, two drills, a sand belt, and last, but not least, a Kerrihard hammer. All these machines are run by power.

Z. T. Clover, Ohio.

Favors Good Prices.—We have a nice little town here of about six hundred inhabitants and only two shops to supply their horses with foot wear. I have a building, 25 by 100 feet, run three fires and possess good equipment and excellent help, so it is up to me to see that the work goes out in good shape. Our town is situated in what is claimed the best part of Iowa, and thus we find ourselves always busy. As you can realize by reading the enclosed price list, which went into effect this spring, we get good prices. I do not think a man loses any work by asking satisfactory prices if he does the right kind of work—that kind which gives satisfaction in return.

THIS GENERAL SHOP OF OHIO IS RUN BY POWER

Wm. Clites, Iowa.

BUGGY WORK.

Set four tires	$ 2.50
Set single tire	.75
Weld tongue brace	.40
Weld thill brace	.40
New pole or thill eyes, per set	1.00
Shackle iron, each	.50
Weld spring	1.00
Bow socket	.75
Set axle	1.25
New tires, buggy, per set	6.00
New stubs, 1 inch, per set	8.00
New stubs, $1\frac{1}{8}$ inch, per set	9.00
New stubs, $1\frac{1}{4}$ inch, per set	10.00
Weld axle	1.50
New springs	3.00
New fifth wheel	3.00
New hammer strap	.50
New clevis	.25

WAGON WORK.

Set wagon tires, per set	$ 2.00
Bolt tires, each	.25
King bolt	.50
Tongue bolt	.35
Tongue cap	.50
Hammer strap	.25
Wagon wrench	.25
New tires, wagon, per set	10.00

HORSESHOEING.

Neverslip shoes per set, eight shoes	$5.50
Resetting shoes	.25
New shoes, common	.50
Hand-turned shoes, per shoe	1.00
Bar shoes	1.00
Shoeing stallion, heavy	4.00
Shoeing stallion, light	3.00

CORN PLANTERS

Sharpen and polish planter runner	$1.75
Sharpen harrow teeth, out	.02
Sharpen harrow teeth, in	.04
Weld lever	.50

MOWERS.

Weld sickle	$ .75
Weld Pitman Rod	.50

STALK CUTTERS.

Sharpen knives, each	$ .30

LISTERS.

Sharpen lister lay	$ .50
Sharpen subsoiler	.20
Polish lister	1.75
Point lay	1.25
New lister lay	5.00

WOOD WORK, WAGON.

New tongues	$3.00
Tongue hounds	1.50
Front hounds	3.50
Rear hounds	2.00
Axle, new	3.50
Bolster	2.00
Bolster, with stakes complete	3.00
Sand board	1.50
Reach	1.25
Box bottom	4.00
Singletrees, each	.50
Neck yoke, each	1.00
Fill front wagon wheel	4.00
Fill hind wagon wheel	4.50
Spokes and felloes, each	.25
Bolster plates, each	1.25
Mower tongue	3.50
Binder tongue	4.00

PLOW WORK.

New lays, 18 inch	$5.00
New lays, 16 inch	4.50
New lays, 14 inch	4.00
Sharpen lays, all sizes	.40
Pointing lays	1.25
Polishing plow	1.50
Straighten beam	1.50
New fin cutter	1.25
Sharpen rolling coulter	.50
Heel landside	.75
Heel on plow lay	.75

WOOD WORK, BUGGY.

New tongue	$3.25
Tongue circle	1.00
Rim wheel	1.50
Spokes, each	.25
Reach, each	1.00
Axle bed wood	1.50
Spring bar, each	1.00
Shaft, each	1.50
Cross bar, each	1.00
Singletree, each	.50
Doubletree, each	1.00

CULTIVATORS.

Point shovels, per set	$2.50
Sharpen shovels, per set	.50
Polish shovels, per set	.75
Sharpen surface cultivator blades	.30

DISCS.

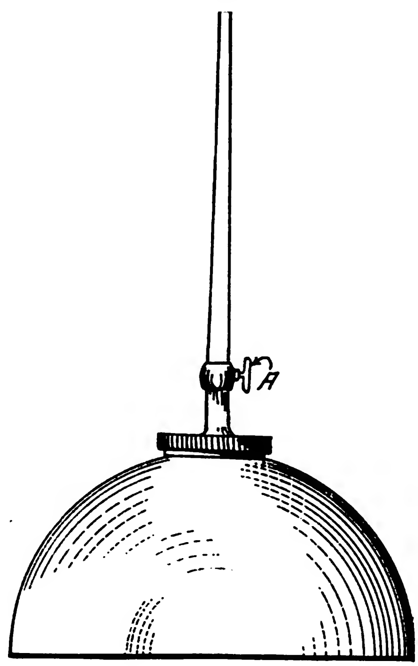
Sharpen, per blade, round	$ .20
Hammer, per disc	5.00
New disc rod	1.25
Weld disc rod	.75

An Oil Can for the Auto Kit.—Almost everyone using an automobile has had the oil can tip over in the kit and cover the tools with oil, making them very disagreeable to handle. I hit upon an idea which has proven very satisfactory, and the expense is but a few cents.

Take an ordinary oil can and cut the nozzle in two, about one inch from the body of the can. Obtain a small pet cock and solder it, as shown in the engraving. When the can is placed in the kit, amongst other tools, the cock may be turned off, and the danger of wasting the oil and spilling it over the tools will be one of the troubles that will disappear. J. N. Bagley, Kansas.

Extract of a Paper read at the Quarterly Meeting of The Ayrshire Blacksmiths' Association, Scotland:—

"I am sorry to say that we are still a long way behind. We, as tradesmen, are still working longer hours than any others and are the worst paid of all. We are of an ancient and mighty race, a trade not of yesterday or today, but of centuries long passed away, or of others likely to come, for all the electric motor and mechanical appliances that are having their telling effect not only on the town, but the country smiths as well. A trade that we have all discovered that to be a proficient workman requires all the strength, deftness and skill that the human frame is capable of commanding and, scientifically, there is



AN OIL CAN FOR THE AUTO KIT

that honorable distinction that places us as a craft head and shoulders above all others. We are the only trade that gains our living on a sensitive living structure—that of a horse's foot. You, no doubt, like myself, will have seen the masons while at work if through any mistake on their part or through any error of the laborer destroy a valuable stone—well, there may be a word or two from the foreman,—but eventually it is replaced, the work proceeding as though it never had happened, and we find it the same in every trade of construction. Not so with the horseshoes. Unless the horse's feet leave our place in a more finished, better adapted and in a more complete way to perform its many duties than when it came to our place we are liable to lose not only the patronage of its owner, but to have our name slandered by every stable hand that gets to know of it. Considering all this I think that we are entitled to have as good a wage as any other trade. When we look around us and see so many masters of other trades retired and living the end of their days in peace and plenty we ask ourselves the question 'how is it the smith cannot do it, considering the strenuous life he has led?' We often hear it asserted that we are the most thirsty, the most illiterate of all tradesmen. When we turn to the literature of a century or two back what a difference there is between the smith of then and today; as at that time we find them the principal men in all towns and villages—the aristocrats of all—having privileges enjoyed by none but himself

"In the more remote English villages he was supposed not only to possess healing, but prophetic powers as well. The clink of his hammer and the roar of his bellows were believed to be more powerful in the keeping away of evil spirits than any other power. In our own country we find the smith a mighty man, we find him pretty often not only leading the choir, but acting as minister as well—look at the wide sphere occupied by the old smith at Gretna Green on the Border, how many a love-sick couple coming up from the South got cured of all their pains and welded fast in wedlock's chains.

"I have heard cases of smiths cutting prices. If it is done with the idea of improving business I say it is wrong. We are not forging a hammer to hit our neighbor on the head, but one that will slowly but surely rebound and hit ourselves with far greater effect. No trade can be half as strong nor have the commanding power on others than we as blacksmiths can if they would only give it the consideration it deserves. By joining the association, meeting together, keeping true to its principles, marching forward as brothers should, sinking our petty differences which may be like a lot of hard black things I used to think of a very near neighbor of mine, which I found as time rolled on that they had existed only in my own narrow imagination, and if the fellow over the way did say when he looked at the horse that you had shod that he could shoe one better with his eyes shut, forget that also; as he knew very well that he could do nothing of the kind. Perhaps he was far from being well that morning, having slept badly the night before.

"I think that there was some truth in a remark by the Right Honorable John Burns to a very intimate friend of mine—he said of all the trades he had tried to get into union, the smiths and farriers were the worst. He found them all right for a year or two, but after that they had no stomach for it; always funking and trying to get through some hole in the wall.

"I should like to see every member of the association ever ready to argue, convince and convert the outsider that by not being a member he was not only sinking himself, but dragging the others down with him. While I was prevailing upon a brother tradesman the other day to attend our meetings he replied that he had never been asked, and that he did not know any of them. I told him that I was a very young member and I could assure him of a right hearty welcome to the meeting by the members and of nothing but fellowship and kindness on every hand, and I am also looking forward to the day when I shall see every master, young and old, in Ayrshire, not only a member, but a bright and shining light in the association, a credit to himself and to all those with whom he comes in contact."

James Russell, Whitlett, Ayrshire, Scotland.

VOLUME 10 NUMBER 4

THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

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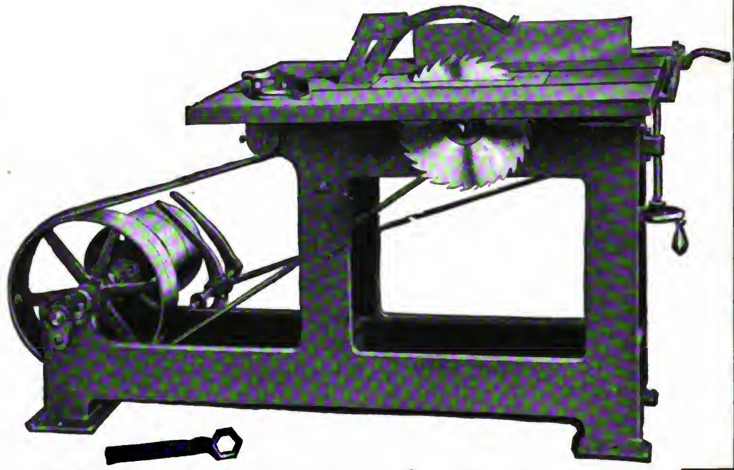

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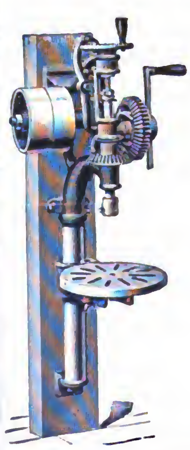

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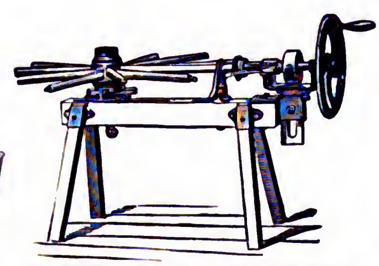

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The American Blacksmith is published monthly at The New Sidway Building, Buffalo, N. Y., U. S. A., by The American Blacksmith Company. Incorporated under New York State Laws. Entered, February 12, 1902, as second-class mail matter at Buffalo, N. Y. Act of Congress, March 3, 1879.

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Subscription Price: $1.00 per year in advance, prepaid to any postoffice in United States or Mexico. To Canada and other countries, $1.50, or, 6 shillings. Reduced rates to clubs of five or more on application. Domestic long-time rates, strictly in advance: Two years, $1.60; three years, $2.00; four years, $2.50; five years, $3.00. Single copies, 10 cents. Cable address, "Blacksmith," Buffalo.

Subscribers should notify us promptly of non-receipt of paper or change of address. In the latter case it is necessary that you give us both the old and the new address.

Our Leading Article.

In "The Passing of the Country Blacksmith in Europe," Mr. George Cormack, Jr., tells our readers of some of the changes that have taken place in the craft in the "Old Country";—changes that we all dislike to see, not because we dislike progress and advancement, but because those changes are displacing a picturesque simplicity that we still love to consider as a part of the smithing craft.

Mr. Cormack has given us an excellent description of the old-time Scotch country town, and many of you will, no doubt, recognize in his description the scenes of boy and young manhood.

A reading of this story would lead one to believe that the writer of it was a professional journalist. However, Mr. Cormack is a decidedly practical mechanic, as may be judged when one learns that he is Superintendent of the Gas Engine Department of the Independent Harvester Company. He deserves to be complimented heartily upon his interesting and well written article.

"Our Journal" and Others.

Did you ever wonder where "Our Journal" stood in contrast with papers of a similar nature? A recent issue of "Advertising and Selling Magazine" contains a directory of technical papers that says more concerning the popularity and true worth of THE AMERICAN BLACKSMITH than anything we can say. For example, it shows that THE AMERICAN BLACKSMITH has more actual subscribers than any other two papers in the smithing craft. In comparison with any one paper, it has considerably more than twice the circulation. And in comparison with the entire list of publications, very close to five hundred in number, THE AMERICAN BLACKSMITH stands in nineteenth place.

If THE AMERICAN BLACKSMITH did not give its readers what they wanted could it ever have reached this standing? If it did not serve its readers first, last and always, could it ever have gained the support of over twice as many subscribers as any other publication in the smithing field? And THE AMERICAN BLACKSMITH will grow still stronger, bigger and greater.

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To the Strangers.

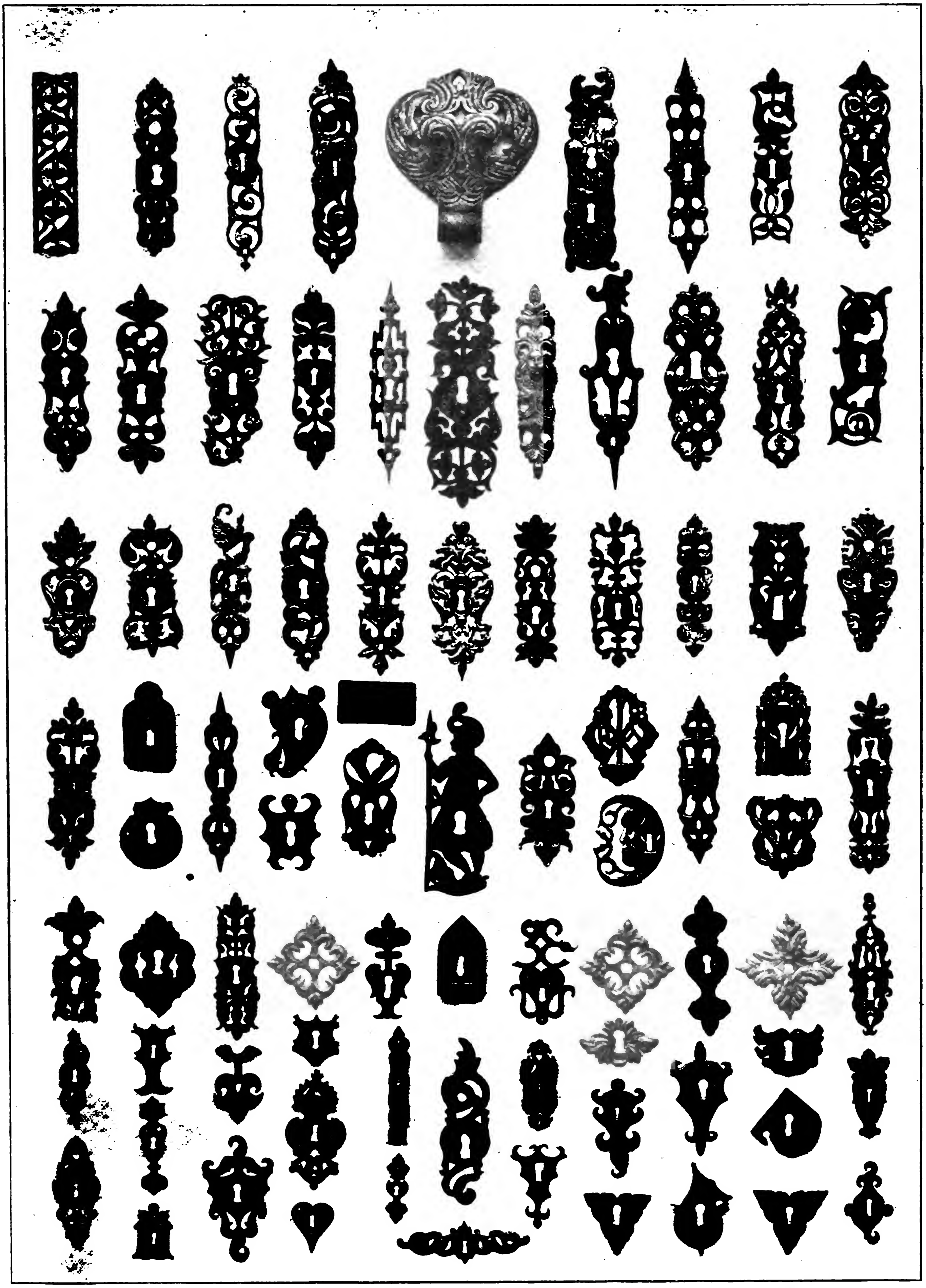
This issue of THE AMERICAN BLACKSMITH will find its way to the shops and homes of many craftsmen who have never before seen "Our Journal," therefore, this word about our paper.

Every number of THE AMERICAN BLACKSMITH has exactly the same number of reading pages and the same full measure of practical information as this number. This is, therefore, a fair sample of what THE AMERICAN BLACKSMITH delivers to its readers every month. We guarantee to give our readers never less than twenty-six full pages of solid craft reading every month. We publish no advertising matter in the reading pages; no trade puffs, write-ups or stale clippings are allowed. Our writers are among the highest authorities in the craft. Such men as George Cormack, Jr., E. W. Markham, J. F. Sallows, Bert Hillyer, James Cran, H. W. Slauson, J. N. Bagley and many others give our readers the benefit of their broad experience. And the coming year's programme promises better, richer and more valuable information than any previous year in the history of THE AMERICAN BLACKSMITH. You want to keep in touch with the latest and best hints, kinks and methods in the craft. The easiest and best way to do this is to read THE AMERICAN BLACKSMITH every month.

A New Series.

With this issue begins a new series of articles on horseshoeing and anatomy. These articles by Mr. J. C. Weaver will, as shown in his initial paper, begin with the form, action and anatomy of the horse's foot and leg, and take up all branches of shoeing, preparation of the foot, forging the shoe, diseases of the foot, etc. In short, these articles by Mr. Weaver will be the most complete series ever published in any magazine.

As to Mr. Weaver's ability to write such a series of articles we will leave entirely to the judgment of "Our Folks." We believe Mr. Weaver's first installment tells more of his ability as a writer and an authority on anatomy and shoeing, than anything we can say about him.



THE RENAISSANCE KEY PLATES OR ESCUTCHEONS OF THE LATE SIXTEENTH CENTURY SHOW EXCEPTIONAL BEAUTY OF DESIGN AND SKILL IN FORGING

The Passing of the Old Time Country Blacksmith in Europe

George Cormack Jr.*

DURING the past summer, whilst traveling in Europe, and having in mind the readers of THE AMERICAN BLACKSMITH, I made it a point whenever the opportunity presented itself to note such things as might be of interest. Most of my observations were confined to the North of Scotland—my native land—as there the old regime was familiar to me. Although I visited several of the Continental countries my inability to speak the different languages made it difficult for me to arrive at statistics which were reliable, and anything which I may be able to tell about what were to me foreign country methods would only be superficial. Generally speaking, however, from what little information I could obtain, the conditions in the leading countries of Europe are in a great measure similar to those which obtain in Great Britain.

Brought up on a farm in the North of Scotland I was intimately familiar with the country blacksmiths, but, as my absence from the land of my birth had stretched along well towards twenty years, the changes which I found amongst my old friends, the blacksmiths, were many and saddening. At the time I left Scotland the influence of the large factor engaged in the manufacture of agricultural machinery by improved and more modern methods was just beginning to be felt. During the years which have fleeted since, this influence has almost entirely driven the old-style blacksmith from the field, along with other craftsmen who formerly did a prosperous business in the small villages of Great Britain. Twenty-five or thirty years ago the small villages of Scotland consisted of a few houses clustered around the church. There was a store, or the merchant's shop," the "Smiddy," or blacksmith shop, the carpenter shop, and the "Cobbler," or shoemaker's shop. The men who owned these different shops were men of position in the community. They were seldom mentioned by any other names than the merchant, the smith, the wright (carpenter), and the soutar (shoemaker). Besides these places of business and the houses of the men who ran them there were a few scattered houses up and down the village street, principal amongst which was the Manse—the home of the parish minister. Such villages belonged to some nearby landed proprietor—the "Laird," usually a blue-blooded aristocrat. The minister and all of these tradesmen had their small piece of land, or "croft," which was rented along with the shop and house. The extent of this land seldom exceeded ten acres—enough to keep a cow or two.

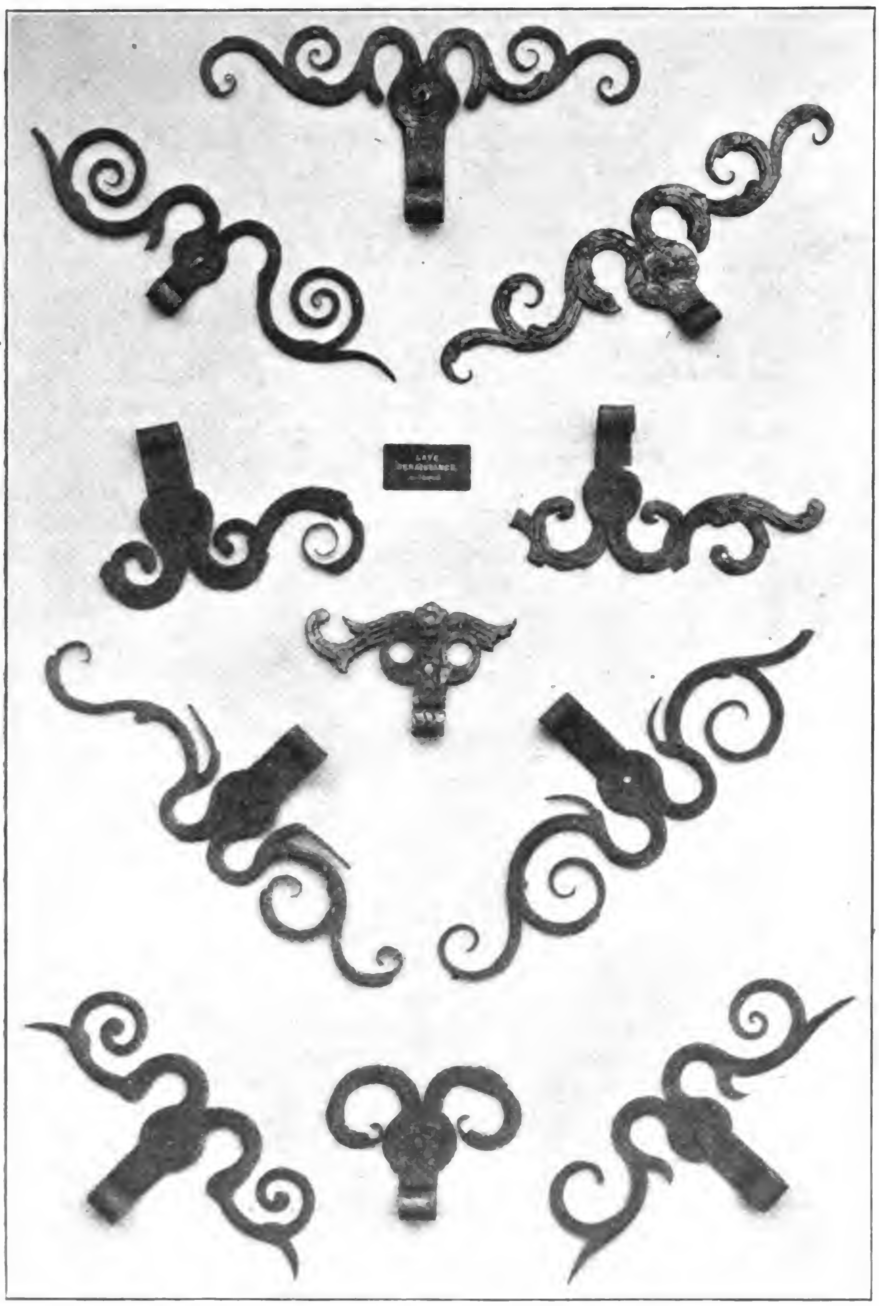
Thirty years ago such villages were prosperous communities. Today, in too many cases, stagnation and desolation reigns. In those bygone days the merchant had a good business. He practically controlled the business of the rural community for miles around. He sold everything—from cloth to hardware. He often had what was called an over-counter license, which allowed him to sell beer, wine and whiskey in bulk. In those days if the farmer wanted a new cart he gave the village carpenter the order, and he built it by hand. Every piece was cut from the plank by hand power; power-driven machinery being practically unknown in country shops. The iron trimmings, the bolts, the axles and tires were all forged on the anvil by the village smith. The finished product was not, as we might be inclined to imagine, a crude affair. It was a splendid specimen of mechanical handicraft. The materials were selected with the greatest care, the lumber used was seasoned for years, and every joint, pin and bolt displayed minute attention to details. Such a cart as was made by these old-time mechanics of the country villages would last a lifetime, and I well remember, when I was a boy, my grandfather having to get two new carts, as the ones he had were worn out, having been in continuous service for fifty-six years. If the farmer wanted a new plow, the smith forged every piece of it by hand. If he wanted a new pair of shoes, the shoemaker took the measure of his foot and made the shoes, sewing them by hand. When the young couples got married, the carpenter made the furniture, the chairs, tables, cradle and beds. In fact, the rural communities looked to the artisans of the village to supply the largest majority of their needs during life. And when, at last, the simple course of life was run, the carpenter nailed up the inexpensive coffin which bore them to their last resting place in the village churchyard.

But the scene is changed. The merchant's business has dwindled—the farmer buys his goods in the large town or city. If he wants a new cart, plow, furniture, shoes or clothes, they are

* See under "Our Leading Article," page 79, Timely Talks with Our Subscribers.

all made for him wholesale in large factories. These changes are doubtless inevitable, and no doubt are for the good of the largest majority, but to one who has seen and has participated in the old village life, with its many interests, confined and narrow though they may have been, it leaves a mental depression which is not easily shaken off. In those days which are gone, the village smiddy or blacksmith's shop was a busy place. The smith was a man of prominence. He employed one or more journeymen and had at least one apprentice. All of his workmen lived and boarded in his house, the journeymen receiving part of their pay in board and lodgings. The apprentices were bound for from three to four years, during which period of apprenticeship they received their board and lodging from the blacksmith, but were paid no money. During his apprenticeship the apprentice practically became part of the smith's family, and the smith exercised the same discipline over him as he would over his own sons.

In the hard and rocky soil of Scotland —a soil a product of the granite rocks— the wear on all agricultural implements used for tillage was enormous. The plow irons, the rock and the coulter had to be taken to the blacksmith's shop almost every day while in use, and sharpened up or pieces welded on. The old-style mould boards, of cast iron $\frac{3}{4}$ inch thick, would wear out in one season's work. These mould boards and the plow irons were not polished as are our plows. A few hours' work would scour the scale off a new mould board, just the same as if it had been ground on a grindstone or emery wheel. During the fall, winter and spring, when the greater part of the plowing was done, the village smith's shop was a busy place. He and his men worked every evening, sharpening and laying plow irons. The shop was crowded every night with the plowmen of the countryside, who carried their heavy plow irons on their shoulders, often a distance of from two to three miles, after supper. These plow irons were no light burden, a new set weighing about thirty pounds, or over. The smith's shop was the center of attraction in the evenings. The merry jest and story were told, and the current events, both local and national, were discussed. The smith himself—the master—carried himself with a dignity befitting his position, and rarely entered into the lighter topics of talk, but his journeymen and apprentices were ready for any lark or rough practical joke which might arise. The master-smith was usually a counselor to whom everyone brought their troubles, both great and small. The young stripling confided in him the anxieties, the elations and depressions of his first love affair. The plowman sought his advice regarding his horses, plows, etc. The farmer came to him when any of his cattle or horses were sick—for he was usually quite skilled as a veterinary surgeon. He and his colleague, the carpenter, tackled jobs of millwright work requiring a high degree of mechanical skill. In short, the smith was a factor of no mean importance in every rural community. Some blacksmiths were famed far and wide for the plows which they built; these plows being much sought after by the crack plowmen who contested in the many plowing matches.

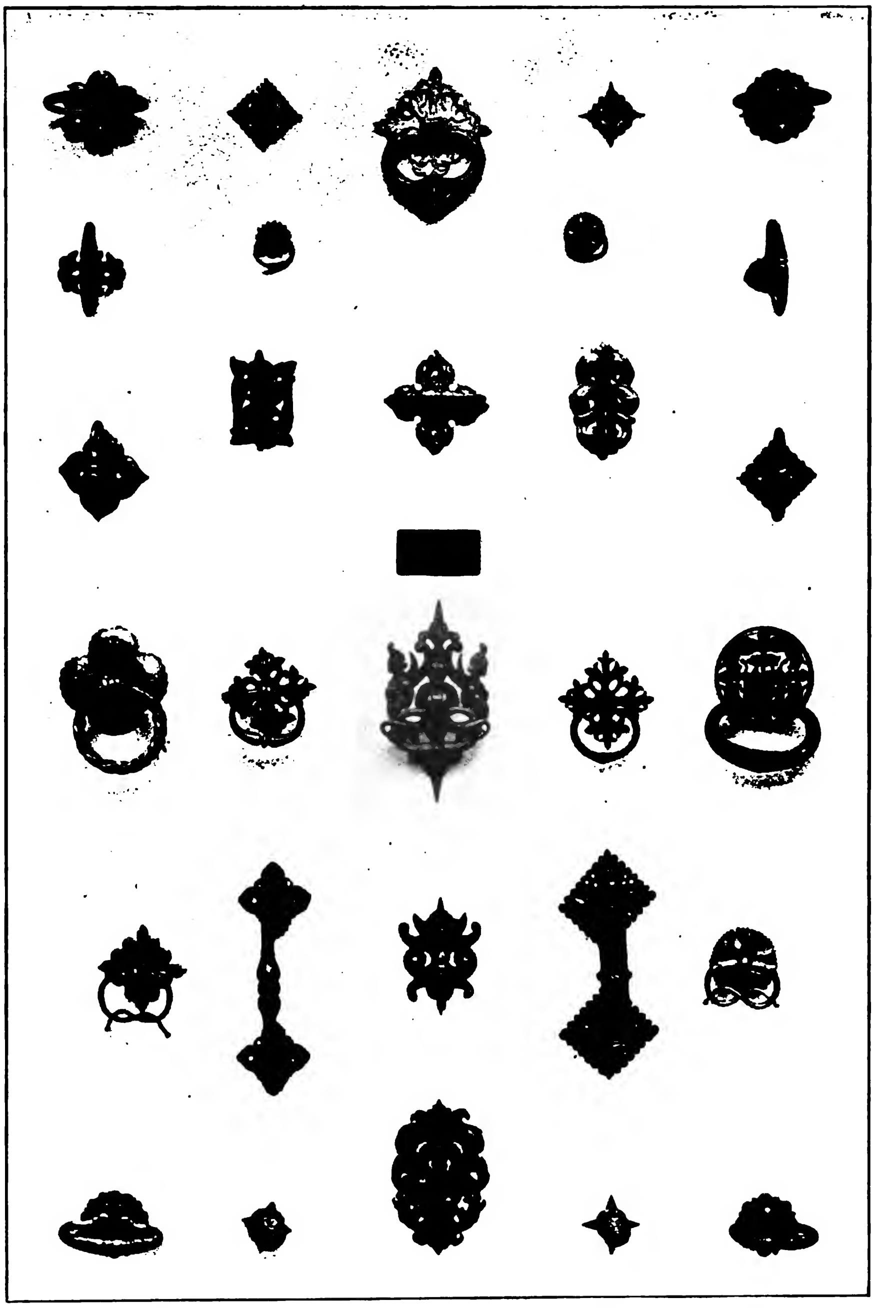


PARTS OF HINGES OF THE SEVENTEENTH CENTURY

Plowing in those days was a trade— we might almost say a profession—for few men attained the rank of prize-takers before middle life. The expert plowman possessed not only a knowledge of plows and plowing, but he had also to have a thorough knowledge of horsemanship. The horses he handled were not jaded, overworked and underfed animals that would stand still every chance they got, but were fiery, high-spirited, well-blooded, and kept in the pink of condition. The plowman prided himself on the appearance of his horses and harness. He spent hours of his own time in grooming the horses and cleaning and shining up the harness. His special pride, however, lay in the control of his

horses by word of mouth. An expert—a master in every detail of the craft—when at a plowing match would often dispense with the lines, and control his restless, fiery horses by word alone. Practically, as we may say, without any connection with his horses he would run his first scratch furrow from end to end of the field, straight as the path of a rifle bullet. I know that many will smile at what may be termed useless effort put forth by those who attained to such a degree of perfection, and that plowing could be done as efficiently in a less perfect manner, all of which is no doubt true, but the fact remains, just the same, that the most efficient workman in any line of life is he who so loves his work that nothing short of the highest ideals can justify his efforts in his own mind. The highest satisfaction to be derived from life is the exultation which we feel when, by long years of patient labor and training, we become masters of our trade or profession and that, given a fair field, we fear no man.

But, to return to our friend, the smith. On rainy days the smithshop was crowded with horses to be shod. Every farmer who had a due regard for the well-being of his valuable horses had their shoes taken off and refitted every four weeks, and if the horses were much on the hard roads the shoes were shifted more frequently. The only slack time which the blacksmith experienced was during the harvest—usually the month of September and part of October. Usually his agreement with his journeymen and apprentices allowed them to leave his service during harvest and hire out as extra hands on the farms. In those days when the scythe was the only reaping machine known, the harvest lasted from six to eight weeks. This system allowed the apprentice an opportunity to make enough money to buy clothes. It was his only chance to earn money during the years of his apprenticeship. During the slack period the smith himself attended to the few small jobs which came in, harvested his own crop and fixed up his tools, his swages, tongs, hammers, etc.

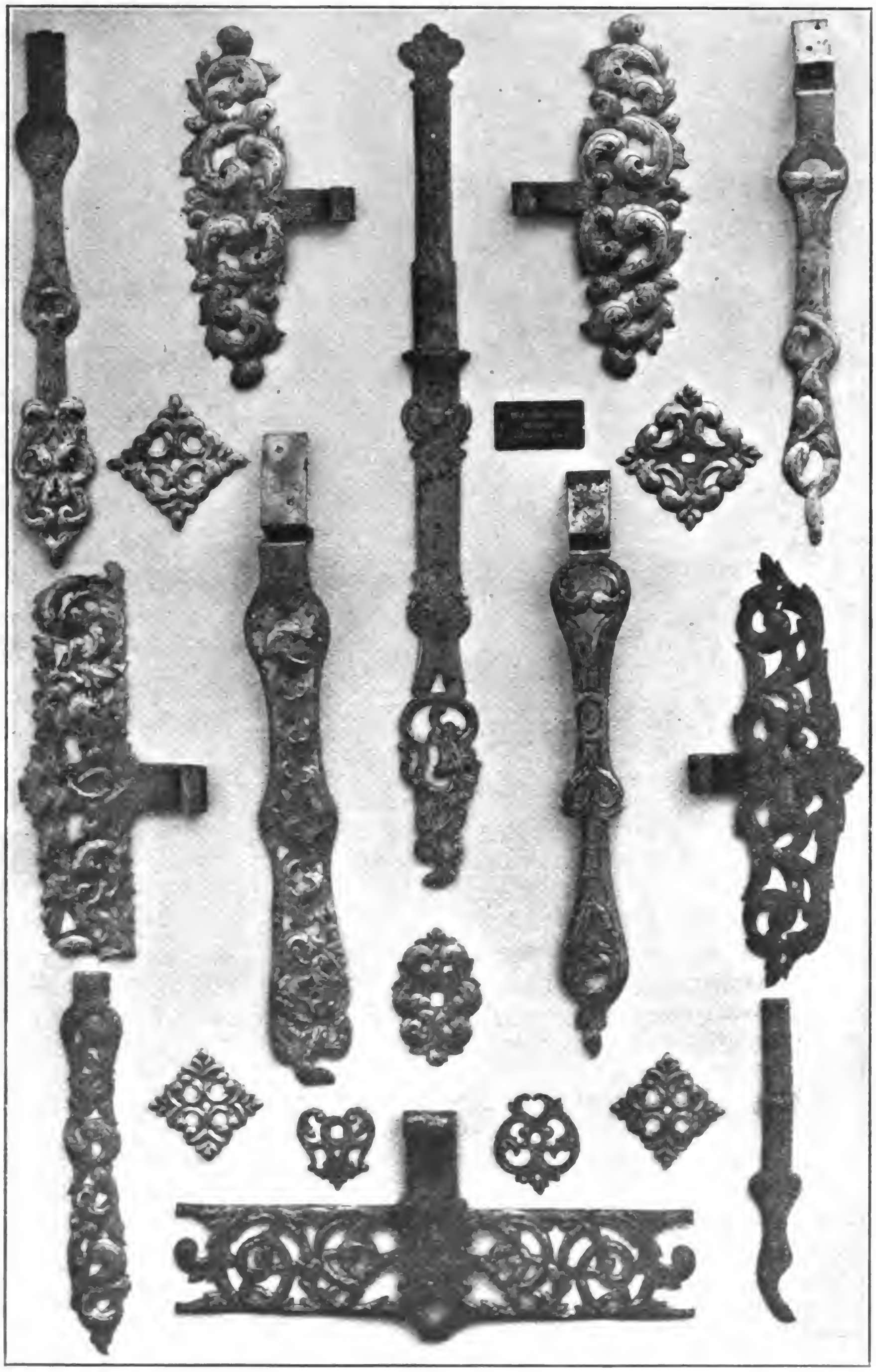


THE SMITH OF THE SEVENTEENTH CENTURY KNEW HOW TO DESIGN AS WELL AS TO FORGE

Many of these smiths made their own dies and taps for the making of bolts, and some of these tools, although they might seem crude to us today, were marvels, when we consider the limited facilities for their production. Nearly all blacksmith shops boasted a lathe of some description; usually a wooden bed or shears, on which were mounted the head and tail stock. All were driven by foot power. The holes in the head and tail stock spindles for receiving the centers were usually square and tapered. The lathe being used mostly as a drilling machine, flat drills with squared shanks were inserted in the center hole in the live spindle, and it can be readily imagined that the truth of the center itself, when used, was not all that it might be. Despite the extreme crudeness of these lathes, taps were turned and threaded in them, and that entirely with hand tools, even a hand-feed slide rest being an unknown refinement. The threads were cut by means of a hand chaser or comb, filed out by the smith himself. The taper ends of the heavy cart axles were often turned in just such lathes with hand tools—no small job—such axles being 2½ inches in diameter at the large end, and 1½ inches at the point, the length of bearing being 14 or 15 inches. It takes a mechanic to do such work, "without tools," as we may say, but these smiths of the bygone days prided themselves in overcoming difficulties.

Apart from his trade and work, the smith was usually a studious, thoughtful and well-read man and, in consequence, was intellectual to a degree above the ordinary level. During the years of his apprenticeship, when he practically had no money to spend, he was thrown back on himself for his amusement and entertainment. To beguile the tedium of his leisure hours, reading was the most

natural thing for him to take up, and in consequence he unconsciously acquired a taste for literature at an early age, and which grew upon him as the years rolled along. Despite their busy lives, many blacksmiths had hobbies which they pursued every spare moment. Some prided themselves on their gardens and made a deep study of flowers and vegetables. Often the blacksmith was a prominent exhibitor and prize-taker at the local flower-shows. The Latin names of flowers, etc., rolled from his tongue as glibly as his native broad Scotch. One old blacksmith, whom I knew when a boy, and whom I had the pleasure of again visiting the past summer, is an enthusiastic taxidermist and entomologist. He has a wonderful collection of birds, wild animals, moths, insects and butterflies, all caught, preserved and mounted with his own hands. Whilst pursuing this hobby he would often spend the greater part of the night on the hills, catching moths and night insects. To look at this man, over six feet tall, brawny and rugged, with large, muscular hands, coarsened and calloused by years of arduous labor, it hardly seems possible that he could have the patience and skill to handle minute and delicate insects. Such work requires the highest degree of delicate handling, and would seem far too fine for the muscular development of a blacksmith. I could not but feel impressed with the sterling characteristics of this man. He is now approaching old age, his business has dwindled from a shop where he employed five or six men to barely enough work for himself and a boy. He is a true type of a vanishing race. He has occupied the same shop for nearly forty years, served his apprenticeship there, and married his master's daughter. He has brought up a large family of sturdy sons and daughters, nearly all of whom have gone to foreign countries to seek fortune where the struggle for existence is less intense.



THESE HINGES AND PLATES OF THE BAROQUE AND ROCOCO STYLES ARE EXCELLENT BOTH IN DESIGN AND WORKMANSHIP

This man has saved enough, through long years of toil and frugality, to see him to the end of his days. His whole worldly fortune, however, would doubtless be thought only a pittance by many of us, who think that we are more fortunately situated, but, when you look in his calm, rugged face, and see the indelible stamp of sterling integrity and honesty there, when you hear his genial voice, as he discourses with intelligent confidence on any subject which might come up, you somehow realize that mere wealth is but the smallest attribute in real happiness and manly worth. You cannot help but feel that such a man has really learned the true secret of life, which is largely embodied in a contented mind, which can find its highest enjoyment within itself, and which can calmly contemplate the declining days of a well-spent life with an equanimity which many would give up their millions to possess.

Twenty-five or thirty years ago such men were common, but the scene has changed. The blacksmith's business in rural communities has gone, never to return. All that is left is horseshoeing and little odd jobs of repair work. Plows, which constituted a large percentage of the blacksmith's business, are made in large factories, and are equipped with soft center steel parts. All wearing parts are interchangeable, and enough repairs to last a whole season can be purchased and attached by the farmer for one tenth of what it used to cost to keep a plow in shape by the old method. The binder and many other labor-saving machines have reduced the work on the farm, and the number of laborers or farm servants has, in consequence, been greatly reduced. The small holdings, or "crofts," in which of yore the country laborer

HINGE PARTS, OF THE SEVENTEENTH CENTURY, THAT THE MODERN SMITH WILL FIND DIFFICULT TO DUPLICATE

dwelt in peace and raised a family of sturdy sons and daughters, have been added on to the larger farms, and the houses and buildings are either in ruins, or are entirely swept away. The laborer and his children have been driven into the cities, or else have emigrated to more favored climes. No one can look at these changes without feeling a sadness for the departed days, and Goldsmith's lines come aptly to the mind:

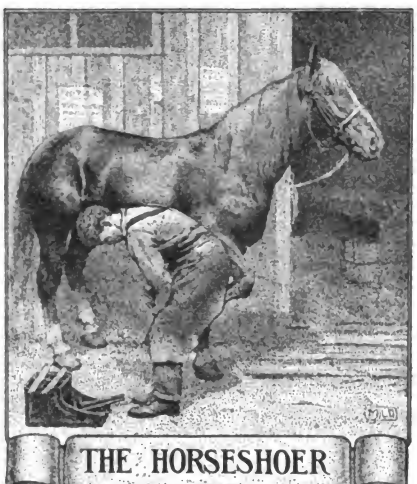
> "A bold peasantry, their country's pride,
> When once destroyed can never be supplied."

To anyone interested in the ancient history of the blacksmith and his craft the old country has countless specimens of old forged work, which shows that at a very early period the blacksmith was a prominent factor in the evolution of mechanical civilization. In the old cathedrals of Europe, forged work of surpassing beauty and of marvelous intricacy of design meets the eye on every side. The scroll hinges of old doors, iron gates, locks and keys give evidence of the skill of the knights of the anvil as far back as the eleventh and twelfth centuries. Old armor, swords, spear-heads, ancient guns, and the metal work of the accouterments of the war-horse show in many cases a finish and elegance of design which but few could reproduce today, even with modern tools. And far less so, when we take into consideration the crude tools with which they were produced. The elaboration of some of these weapons of warfare—especially such as were at one time used by men of royal blood—must have taken years of labor to produce. We look on the breech-loading gun as a very modern invention, and in its perfected form this is doubtless true, but in the guard-room of the Tower of London there is a breech-loading pistol of the time of Henry the Eighth. This weapon has been carefully preserved. It is not a crude affair, but shows the finest kind of workmanship and finish. When we look at all these things—the product of skilled brains and hands long since mouldered to dust—we must remember that in those days there were no machine tools such as we have today, and that most of the work was done on the anvil; the finishing and fitting of the parts being done with crude hand tools. In the days of old, only one craft surpassed that of the blacksmith, and that was that of cutting stone and building. The mason was the head of all crafts. The old castles and cathedrals, with their massive columns of elaborately cut stone, their countless carvings, and lofty, vaulted roofs of stone stand today as impervious to the storms of winter as they did when they left the builder's hands six or eight hundred years ago. No one with a thinking mind can stand in any of these old cathedrals without being impressed. No matter what your ideas on religion may be, you may have no religion, or think you have none, but you cannot be in one of these old buildings where the history of bygone centuries is materialized before your eyes without your mind taking a loftier strain of thought. You feel that you are standing on ground and surrounded by objects that have seen every phase of human emotion, every scene of the great drama—often a tragedy—of the evolution of our present civilization from barbarism to our present day. These walls have seen barbaric splendor, joy, happiness, elation, triumph, pomp, glory, tyranny, despotism, cruelty, wretchedness, misery, torture, despair and death—all have been exhibited here. These walls have rung to the shout of triumph and victory, and they have echoed to the last dying shriek of the tortured martyr. You leave such places feeling that you have stood on holy ground. I do not mean by this that the place is holy because consecrated by some great ecclesiastical dignitary, but consecrated by the fact that here men have lived and died for man.

I wander from my subject, however. Turning to the present-day side of

MR. J. KEENAN'S YORK STATE SHOP "UNDER THE SPREADING"—

blacksmithing in the old countries of Europe the conditions are much the same as here. Most of the work is done in large factories, where the old-time anvil and the old-time blacksmith are almost unknown. Power hammers and special tools do the work rapidly and with a greater degree of accuracy than was possible by the old methods. The all-around blacksmith—the man who could forge almost any piece on the anvil—is a scarce article, and is usually a man of advanced years who was trained under the old regime. The advent of improved machinery in all lines has brought us to the day of the specialist. It has reduced the cost of all manufactured articles without reducing the earnings of the workman. It has brought the luxuries of the rich of a hundred years ago to be the necessities of the ordinary workman, but it has taken away much of the picturesqueness of life, especially in rural communities, not only in the old countries but also in our own land. It has also brought a restless, feverish desire amongst all classes—a chronic discontent which cannot be altogether for the best interests of the human race. We are all in too much of a hurry—we don't take time to live. We hustle, we scheme and we strive for something intangible which forever eludes our eager grasp, and at last we close our eyes and sink into our last sleep, feeling that we have reached the end, but without attaining the goal. Every man should take time for a calm contemplation of life and its many opportunities for real happiness. We are continually striving for the happiness which is to be ours tomorrow, forgetting that we are living today, that the present moment is the only eternal, and that happiness is as much within our grasp today as it ever will be.



The Abuse of the Horse in the Shop.

FRANZ WENKE.*

In the November number of THE AMERICAN BLACKSMITH Prof. Beery touches on cruelty to animals. Every word he said is true, but he did not say enough.

Not only on the road, but also in shops, much cruelty is practiced today, not only in beating, unnecessary tying up and otherwise getting a well-bred, and consequently high-strung horse startled, is cruelty practiced, but also on the horse's foot in shoeing it.

For instance, the cruelty most commonly practiced is the attempt at making a pleasing job by rasping off the whole of the periople from shoe to coronet. This is one of the worst cruelties man can think of. We all know, or at least should know, that the periople (the shiny, glossy outside of hoof) is absolutely necessary to the life and well-being of the whole foot. To remove this thin, varnish-like skin from the hoof means to expose it to the influence of undue moisture at one time and undue drying at another. More than one ailment may be ascribed to this practice, and the more so at this time of the year, when wet weather, either rain or wet snow, will soak a foot so treated like a sponge. Take a horse whose hoofs have been treated in this way and who has traveled several miles on a wet day, either in light harness or heavy load—his feet will be more or less heated, owing to exercise and consequent increased circulation of blood. Let this horse stand out in the cold, either from necessity or from neglect, and if the day should turn colder, as is very likely to happen toward evening at this time of the year, his feet will become chilled, if not actually frozen through and through. The consequences will surely show in the spring, if not before.

Another cruelty is the excessive paring down in order to overcome the high, sharp calks. This will have the same effect as the above-named rasping of the periople. Why have the foot trimmed till the sole yields to the pressure of the thumb? Would it not be better to make the calks a little lower? The high calk will not penetrate a hard, slippery surface any deeper than a short (low), well-formed calk will, and the low calk will not necessitate having the foot trimmed down in order to bring it to the ground.

Right here let me say that the omission of the toe-calk (using only the heel-calk) is a nefarious practice, as it is bound to throw the foot out of balance, put undue strain on the foot and will not, under any condition, prevent stumbling, as is often asserted. Of course, this applies only to normal conditions, and not to pathological ones.

A most severe cruelty to the horse is perpetrated by excessive clipping. A big, heavy clip, reaching half way up the hoof and laid on the hoof with a hand-hammer, surely will keep the shoe in

* Mr. Franz Wenke is an expert shoer in the United States Army Service. He has made a close study of anatomy shoeing and diseases of the feet.

place. But will not the heavy pounding on the clip injure the foot internally? If it will not do worse it surely will pain the horse at the time, and especially if he has cold feet, which he most certainly will have in winter time if his feet have been subjected to treatment just mentioned. Clipping may be a necessary evil in some localities, but it need not be a clip which a man has to drive down with all his might. A good many more cruelties could be mentioned if space would permit, but I think these enumerated here are the cardinal ones. They should not need the intervention of the S. P. C. A., but should engage the attention of the foreman or master-horseshoer in the shop.

What Horse Training Is.*

PROF. JESSE BEERY.

Training horses is so fixing habits that are suitable to man's use that these acquired habits are stronger than the natural instincts. For instance, you have a horse that is nervous and frightened at objects, its natural inclination being to get away from that thing as quickly as possible. Maybe in getting away from the thing which frightened it, it took buggy and occupants along with it and smashed things up in general. When a horse is well trained he may look at the object and tremble from fear, but the word "Whoa" has been so taught that the habit to stand is stronger than the natural inclination to run.

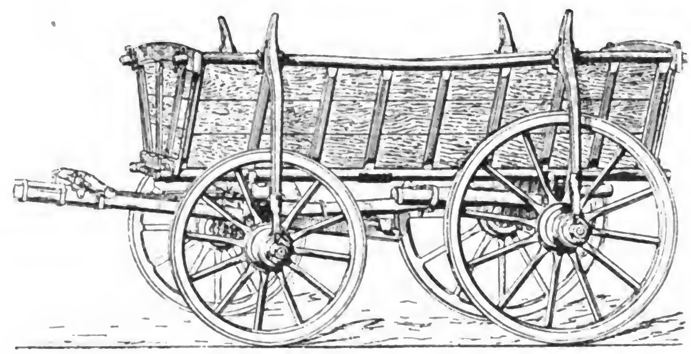
When it is fully understood that horses do not reason and that their actions are the result of instinct and following the line of least resistance we must come to the conclusion that, to the horse, his actions are neither good nor bad. He acts instinctively and for self protection, and when his actions coincide with what man desires we call him a good horse, and if the actions of a horse are not those man most desires we call him a bad horse.

Man's place in training a horse is to guide his actions in such a way as to avoid the wrong and make it easy to do the right, and then, by repetition, so fix the desired act that by word or signal from the master the action that has become a habit through repetition will follow as naturally as the instinctive habits common to the horse.

Everyone who has had anything to do with horses knows that all horses do not resist in the same way, caused by the variation of their instinctive habits. And no one can think of avoiding the wrong things and always doing the right if he does not understand the colt's disposition well enough to know that what causes one colt to act a certain way might cause another to act just the opposite.

Just as a student in human nature sizes up the man by his facial and other outward appearances so ought a horseman be able to tell, by the contour of a horse's face and head, the predominating traits of his character. I have never attempted to handle one horse, among the many thousands handled, without first knowing what I had to contend with.

I will describe a few heads and give the predominating traits that it may help the readers to judge for themselves whether disposition can be told by the contour of the head.



A RURAL WAGON OF GERMAN MAKE—NOTE METHOD OF BRACING THE SIDES OF THE BOX BY MEANS OF STAKES SUPPORTED BY THE OUTER ENDS OF THE AXLES

The ideal head is uniform, without any one feature becoming prominent. The head has plenty of space between the eyes and from the eyes to the ears. The eyes are large and kind. The ears are good sized and well set on the head, not being too close together. Such a horse has a kind disposition and will obey willingly, without being easily aroused. It will be teachable and have life enough to do its work without continual urging. It will never fight, except in extreme desperation, and then it would fight for its life, and fight hard.

Another type that may be easily identified is the nervous type. Its eyes are large but fiery. The eye sets well forward, as though it had been pressed forward, looking for something at which to scare. The smoothness of the forehead will be broken by creases in front of the eye. The ears will be moving almost constantly with nervous twitchings, indicating that the eye is also watching in all directions.

This horse is ready to act at the least irritation. Some unfamiliar object or sudden racket or a slight touch upon some part of its body that is not accustomed to being touched is sufficient to start it. Its fight will be quick and hard. It will resist principally by kicking and bucking. Unless overpowered it will not cease until it is entirely free. Rough treatment with a horse of this disposition only makes it more fearful and vicious. It takes positive treatment; but one who loses his temper has no business handling a horse that has been spoiled. It requires cool, deliberate judgment to handle horses. If treated kindly and judiciously this type of horse becomes one of the most stylish and useful of all dispositions.

Another head of a far different character is the one with a small eye set back in a heavy jowl and the ears coming from the same place at the top of the head. Its actions belong more to the sullen type. It will resist in any way a horse can and will do it with but little or slight provocation. He principally depends upon balking, and usually kicks with one foot at a time while balking. He will fight slow, but keep at it a long time. When once he gets "set," any abuse will only fix him more firmly in his stubbornness. His mind is sluggish and he fails to comprehend as quickly as others. When the least confused his mind becomes inactive and any irritation only brings out his anger.

His condition of mind resembles somewhat that of a boy who attempts to make his first speech. He begins—makes a mistake and becomes confused. He begins again—makes a more ludicrous mistake and is more confused. He does this two or three times until he is so confused that he cannot think of anything, and simply stands—doesn't know enough to take his seat. Notwithstanding his confusion, if the crowd laughs at him he becomes angry enough to fight the whole crowd.

I have space here to make mention of only these three heads. There are only a few types of horses with combination of one or more of these types. After a short study one is able to tell at a glance the type or combination of types one has to deal with and know to a

* This is Prof. Beery's second paper on horses, their abuse and training. The third will appear in an early issue.

certainty the natural propensities and go about his work of training intelligently.

A horse's disposition must be understood before any training becomes effective. One is so apt to do the wrong thing, or do the right thing at the wrong time, which is as fatal to success as to do the wrong thing.

To one interested in horses nothing is more fascinating than studying the horse's mind and to be able to take advantage of its many different whims and turn him from wrong to right habits. To do this, man must be absolute master of himself, even-tempered and calm under all conditions.

Shoeing the Horse Correctly—1.

J. C. WEAVER.*

The Form, Action and Anatomy of the Foot and Leg.

While the shoer is more particularly concerned with the visible foot, or hoof, it is very necessary that he know something about the leg above the foot and the inside of both the foot and leg. A shoer cannot be a good shoer unless he knows something more about the horse's foot than what he is able to see on the exterior.

The general appearance of the foot is familiar to everyone. And anyone who has made even a casual examination of a horse's feet will readily find that all feet differ, so that one is able to tell a fore foot from a hind foot, and also a left from a right. This difference may, of course, be modified by disease, but in the healthy state the differences are readily distinguished and the foot recognized.

In connection with these talks on anatomy it may be well for the reader who is unfamiliar with the interior of the foot and leg to procure some specimens taken from a dead horse. These may be treated as follows: The first may be buried in ground that is somewhat damp until the flesh and soft parts fall away from the bones. The second should be cut off at the fetlock joint and soaked in water until the hoof can be separated into three divisions, namely—the sole, the wall and the frog. The third specimen should be sawed vertically down the center through the point of the toe. With these specimens one can easily trace the various parts, tissues and structures that make up the horse's lower limb and foot, and see how important each part is.

To begin our examination of the horse's foot and leg we will start with the wall of the foot. This is the hard, horny, box-like structure incasing the foot in front and at the sides. Behind, or at what are known as the heels, the wall turns in upon itself and comes forward toward the center of the foot until it becomes a part of the sole. These two branches, running forward, follow along each side of the frog and are known as the bars. They increase the bearing surface of the wall structure and tend

HOW AN ALABAMA SMITH HANDLES 'EM

to make for greater solidity in the entire hoof. The shoer who knows the purpose and function of the bars does not "open the bars." Some seem to think this practice necessary to the growth of the foot. It is, however, unnecessary to say that this theory is wrong, and the practice is certainly not correct.

The wall extends from the coronet downwards and outwards. If you have soaked a foot and separated it into its several parts you have found the interior of the wall to be lined with thin, horny projections running parallel to each other from above downward and forward. This peculiar lining is known as the horny laminæ, and corresponds to a similar structure on the sensitive foot, known as the sensitive laminæ.

The thickness of the wall varies, it being thicker at the toe than at the sides, and again thick at the heels where the bars join the wall proper. Vertically, the wall is practically uniform in thickness, being about the same from coronet to bearing surface. Naturally, of course, the wall is hardest at the surface, gradually softening toward the inner surface, thus providing suitable protection for the sensitive parts which are necessary to the healthy growth of the foot.

The next division of the foot is the sole—the bottom or floor of the foot. The sole is arch-shaped and attached to the wall at its outer edge. Its structure is practically the same as the wall. It consists of short fibers, which run in the same direction as the fibers of the wall. The sole is hard and tough, so as to protect the inner and deeper structures from injury.

The frog is the triangular spongy body set into the sole and between the bars of the foot. It extends from the bars at the heel to the center of the foot, where it diminishes to a blunt point. The frog is attached to the bars at their upper edge only, thus leaving a channel, or fissure, on each side to allow the frog to expand when pressure is placed upon it. It can be readily understood that, were the frog set into the sole and between the walls without the spaces on each side of it, the frog would either be prevented from expanding under pressure or, which is more likely, the foot would be injured, because of its expansion. The frog is not, as many suppose, a thick, solid mass. It is simply a layer of horn, and it follows the outline of the structures above it.

As we have considered the outer, or visible portions of the foot, we will now take up the inner structures. We have already mentioned the sensitive laminæ which rests between the folds or leaves of the horny laminæ on the inside of the horny wall. By this system of interleaving, or folding, an exceptionally strong connection is made between the horny and sensitive structures of the foot.

The laminæ have the power to secrete a soft horn and, while not very active in this respect in health, diseases excite the structures to great activity in many cases, thus causing an overabundance of horny growth. In laminitis, for instance, the laminæ may be so active in the horn-secreting function as to form a mass at the toe, and to push the true wall forward and out of position. Again, in the case of crack in the wall that has been allowed to go uncured, the laminæ, in its activity, causes a horn tumor.

The sensitive sole is that portion of the interior foot to which the exterior sole is attached. Its surface presents a hairy, or furred, appearance which is called papillæ, from which the horn fibers of the exterior sole are formed.

The sensitive frog is similar in structure and appearance to the sensitive

* See under "A New Series," page 79, Timely Talks with Our Subscribers.

A WELL-EQUIPPED TEXAS SHOP WHERE MR. MILO BROWN DOES ALL KINDS OF GENERAL WORK

sole. Its form is exactly that of the healthy exterior frog which covers and protects it.

The coronary band lies between the upper end of the sensitive laminæ and the edge of the skin. If you have taken a foot apart you will have noticed a groove in the upper edge of the horny wall. The band that fits into this groove is called the coronary band. It secretes the wall of the foot. Its surface presents an appearance similar to the sensitive sole. The horn fibers of the wall are formed by the papillæ of the coronary band. From between these papillæ comes a soft, horny matter which, with the horn fibers, make up the wall structure.

In the foregoing one cannot but note the close and intimate relationship between the exterior and interior of the horse's foot. It can be easily understood how carelessness on the shoer's part will injure the interior structure of the foot. In fact, so close is the connection between the outside and inside structures that it is difficult to understand how any injury to the exterior of the foot, however slight such injury may be, can fail to be transmitted to the interior sensitive structures.

In shoeing correctly it is necessary to consider very carefully the growth of the foot. In the natural state the horse's foot keeps itself in proper form. It wears away, or breaks off, as it grows; thus the foot keeps its proper size and shape. When shod, however, it is just this wearing and breaking off that is guarded against, so it is the shoer's duty to keep the foot in proper shape and size. It is, of course, understood that the wear and tear on an unshod foot is much greater on the roads and streets than on the turf trod by the horse in his natural state.

When a horse's feet are allowed to grow excessively, the toe becomes too long and the heels too high. This raises the frog too high from the ground, preventing it from contact with the ground, and this state, if continued for any time, will cause the frog to shrink and weaken. Then, too, when the hoof becomes too long, the center of bearing is carried forward, and as the center of bearing has a true and proper relation to the limb, any departure from that relationship must affect the limb and foot unfavorably.

The natural growth of the wall averages about an inch in three months; thus the entire hoof is replaced in about a year. And right here may be stated a fact that many horse-owners and shoers don't seem to know, and that is that the growth of the horn, or hoof, cannot be hastened by anything applied to its surface. When it is desired to help the growth of the wall it is necessary to stimulate that part of the hoof where the wall is formed, or produced, and the hoof wall is produced by the coronary band. Therefore, to promote or hasten the amount of hoof wall being formed it is necessary to stimulate the coronary band. Hoof ointments, or salves, applied to the surface of the foot may prevent dryness and brittleness of the horn, but they cannot increase its growth.

A word about rasping will not be out of place here. In its natural state the wall of the hoof is coated with a sort of varnish, which is there for a distinct purpose. That purpose is for the protection of the pores of the horn. We paint our houses, shops and barns to protect the wood from moisture and heat. The wall of the horse's foot is coated with a varnish-like substance to keep the pores of the horn from absorbing too much moisture, and to prevent, also, evaporation of the natural moisture of the foot. Therefore, the health of the foot requires that the hard outer covering of the hoof be left undisturbed and as little rasping as possible be done on the surface of the wall.

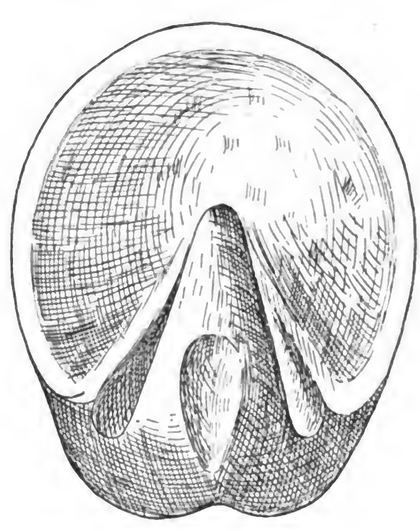
(To be continued.)

Should the Horseshoer Be Responsible?

CHAS. WALTER.

As this incident happened in our State, and not far from where I live, I desire to have this subject discussed: Should a horseshoer be responsible for the limb or life of a horse in a case of this kind? Here is a description of the case, as it appeared in the Oregon Daily Journal:

"A Lebanon blacksmith named Mayer was shoeing a farmer's horse. When the horse acted ugly, the smith attempted to put a rope on one of the animal's feet. The horse threw himself, broke one of his legs and had to be shot. The smith promptly paid the owner $185 for the horse. Mr. Mayer has been in the blacksmith business in Lebanon for about twenty-eight years, and in that time has shod thousands of horses, and

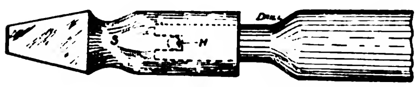


A HEALTHY FOOT MUST HAVE A WELL-FORMED, HEALTHY FROG

this is the first accident of the kind that has ever happened in his shop."

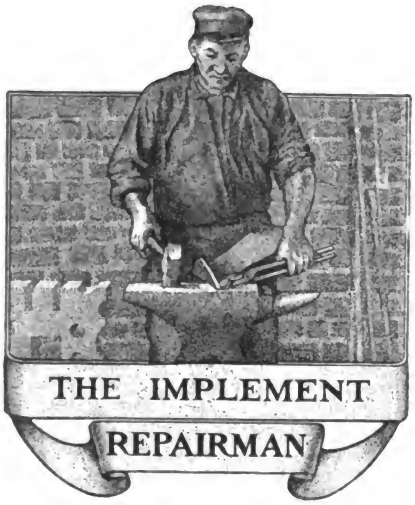
I wish to say that I have shod every horse or mule that has come to my shop during the last twenty years. For the first ten years I used a side line, threw them and tied them, while the last ten years I have used stocks of my own make. I have never killed or hurt a

horse, but always take them on this condition: If the horse has his leg or neck broken he still belongs to his owner, and his owner is responsible for him. On the other hand I will be responsible for the breaking of my neck or leg in managing a horse, and will not expect the owner of the horse to pay for my injuries. A brother blacksmith and friend of mine in this county had his leg kicked and broken by a horse some few years ago. If I am correctly informed he paid his own doctor bill. Therefore, if my friend had to pay his own doctor



THE BROKEN DRILLS ARE USED THIS WAY

bill, when hurt while shoeing a horse, why should the blacksmith have to pay also for any injury done the horse? I say, let the man with a bad horse run his own risk, for most of us would assuredly rather shoe a gentle horse, or employ our time doing something else than guarantee a $185 horse, and perhaps get one or two dollars for shoeing it. (I charge one dollar extra for putting a horse in the stocks.)



Three Labor and Money-Saving Kinks.

J. N. BAGLEY.

To Make the Pump Work Easily.

If a well is very deep it is very tiresome to pump by hand for any length of time. If a few holes are drilled in the handle, as shown at B, about three inches from the fulcrum and one inch apart, a spring from an old cultivator, or something similar, may be attached to the brace rod and hooked into one of the holes already drilled, and it will be surprising to see how much easier the pump will work. Many times a weight is attached to the end of the handle for this purpose, but the spring will have advantages over the weight. As the handle is lifted up, the spring is stretched without any special effort, and as the handle is again pushed down it helps more than would be imagined.

Using Up Broken Drills and Reamers.

In looking about the shop, almost everyone will find a number of drills and reamers with the shanks used up until they cannot be held in the brace. The following I have found to be very successful in using them until worn out. File or grind the broken end until square, and saw a slit ⅛ inch wide and ¼ inch deep. Next forge a shank, as shown at S, and drill a hole to let the shank of the drill up into it about ½ inch. Drill a ⅛-inch hole and place a pin, H, so it will fit into the slot in the shank. In this way the drills and reamers about the shop may be used up.

Using Up Broken Hacksaw Blades.

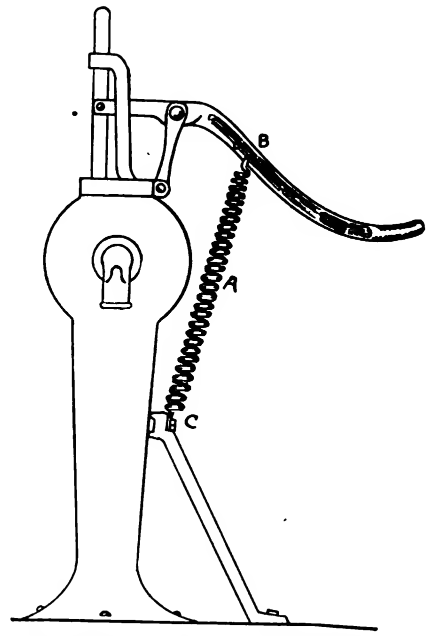
Very often a new hacksaw blade is broken, and it then becomes a loss. I hit upon the following and it has proven very successful in using the blades until they are worn out: Take a piece of steel for a die ½ inch by 1 inch by 3 inches long. To this I fitted the shank, C, to fit into the square hole in the anvil. To this I hinged a similar piece to carry the punch, as shown at A. The punch I made of ⅛-inch tool steel and fitted into a hole in the upper half. After fitting I found where the punch would strike the die plate at the bottom, and into this I drilled a hole that the punch would just slip through. To use the tool I heat a pair of tongs to a bright red and hold the end of the broken blade to be punched until the temper is drawn about ½ inch back, and then cool. By placing the end under the punch, and striking at D with the hammer, a hole will be punched as in the opposite end and the blade may be used again.

Some South African Methods of Paying the Smith.

F. UNDERWOOD.

The following incidents will tell what the smith in British Becuanaland has to put up with at times.

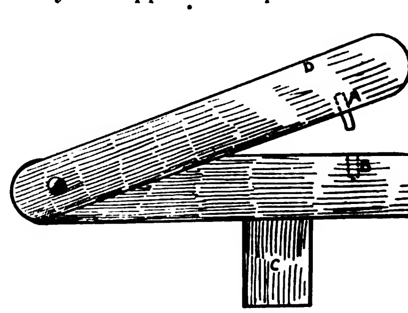
While I was visiting a smith's shop the other day two native farmers came to the shop. One of them had a pick to be sharpened; the other had two plow wheels to be repaired. Native Farmer No. 1 wanted to know if the smith would loan him his bellows and tools with which to sharpen his pick, as he had brought his own charcoal, and if the smith would be kind enough to loan him his tools the sharpening would cost him nothing! Native Farmer No. 2 wanted axles put in his two plow wheels, and in payment for the job had brought an old broken part of a wagon absolutely useless to anyone. I then asked the smith



THE SPRING HELPS TO OPERATE THE HANDLE

if these were the kind of people he worked for. "Oh, that's nothing," said the smith. "I had a Boer farmer here the other day who wanted the seat of his wagon repaired, and in payment brought me that piece of steel, telling me that the steel was worth more than my work of repairing the seat, as it cost 9d. (18c.) per pound." The piece of steel in question is ⅝ inch round, 15 inches long, and came off a "Flying Dutchman" plow.

I have been twenty years at the smithing and shoeing trade; I served five years apprenticeship in a country



BROKEN HACKSAW BLADES ARE MADE USABLE

shop in the south of England and worked in several shops in different parts of the country, since, but I never heard or saw anything to beat this.

If any smith has heard anything better than this I should like to see it through the columns of our valuable

journal, THE AMERICAN BLACKSMITH, as I think there will be more than one of the craft join me in a good laugh.

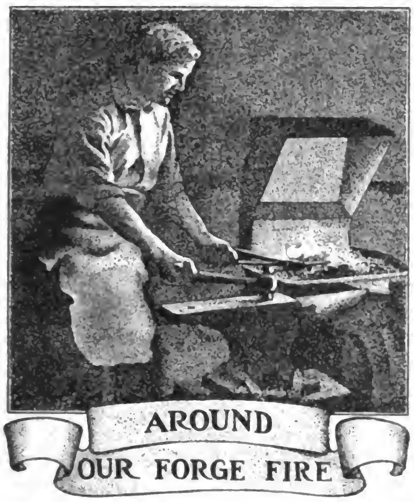
An Advertising Card.

A very good piece of smith-shop advertising matter found its way to our desk from Correll & Son, of Illinois. One side of this card is shown in the engraving. The other side contained the following message:

"Dear Sir: For nearly forty years (ever since the writer's grandfather came here and started blacksmithing) all blacksmith work in this 'neck of the woods' has been judged according to Correll's.

"You cannot discuss blacksmithing with any farmer or horse owner for ten minutes without comparing the work with Correll's.

"Is this not ample proof of the superiority of Correll's work? If you are inclined to doubt it try us.



"Hello, Mr. Editor!" exclaimed Benton as he stepped into the "Forge Room."

"Hello, stranger!" returned the Editor. "Haven't seen you for a whole month, Benton, where have you been?" and the Editor laid down his pen and motioned Benton to his favorite arm chair.

"I've been up in the country," replied Benton, removing his coat and making himself comfortable. "And, naturally, while I was up there I fussed around the blacksmith shops to see if I could learn anything new."

"Well, did you get anything new?" questioned the Editor.

"Yes, I got several new things and I also received a pretty bad shock. One of the apprentice boys—a likely looking chap—asked me what his chances were in the trade. I made a bluff at answering him, but, do you know, I really couldn't give him any very strong arguments."

"That surprises me," returned the Editor, "and I think, Benton, you should be ashamed of yourself. Here you've been talking smithing for years, have done some work yourself and know quite a little about the practical end and yet when a youngster asks you a question you can't put up a real good, honest talk on the business end of the trade. If anyone had told me you couldn't answer a question like that, I would have told them they didn't know what they were talking about."

"Well, I'll tell you, Mr. Editor, it's just this way. Since I've gotten out of active harness, I've been paying so much attention to the practical working end that I have lost sight of the business and money end. If you can I wish you would give me some information on the financial end for the chap who starts to learn the trade."

"I'll be very glad to give you some figures," began the Editor taking a roll of papers out of one of the pigeon holes in his desk. "Here are some figures that will interest you, and if you had given something along this line to your youngster when he put that question up to you he would have been started on the right road.

"You hear a good lot these days" continued the Editor, "about the pay that brick layers and masons make. And the talk you hear is quite correct, for if you will look at this table you see that brick layers get pretty good pay. They average about 52 hours a week and get something like 42 cents an hour. Carpenters don't do quite as well. They work about the same number of hours, get but 32 or 33 cents an hour and, of course, don't make quite so much in a day. On the other hand a blacksmith while helping gets from 25 to 29 cents, and he averages about 53 hours a week. When he gets a fire of his own he receives from 30 cents to 53 cents an hour or an average as good as the brick layer gets with a big chance of doing much better.

"Now take a machinist, who works along, in many cases, similar lines. The machinist averages about the same number of hours as the smith, but his rate of pay is considerably less, averaging about 20 cents for a beginner to about 35 cents for an experienced man. And so you'll find the blacksmith comparing favorably with all the trades in the matter of both time and wages."

"Well, now, if I had had that information when the young chap asked me about his future I could have started him along the right track," said Benton when the Editor finished.

"Now, Benton, let us have some of those new receipts of yours. You say you got hold of some new ones, better let our readers know about them."

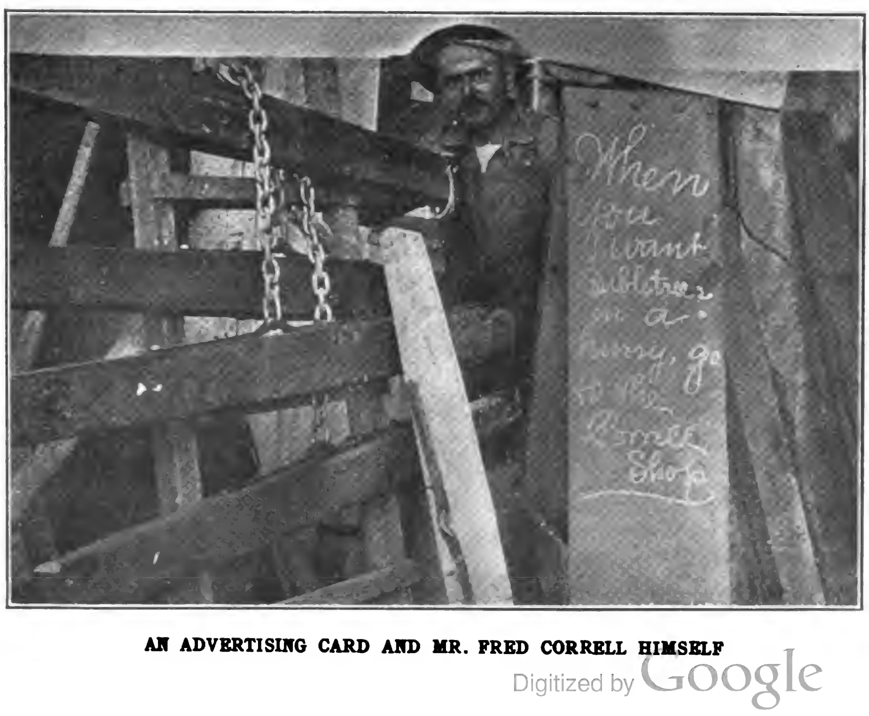
"I've got several that I think will just about suit our folks," returned Benton as he opened his receipt book. "Here's a good metal polish that is suitable for most any metal. It will polish gold as well as nickel and is easily made. Mix sufficient crocus powder and kerosene to make a paste. This is rubbed on the metal with a cloth—rubbing it well—and then polish with a clean, dry cloth until the metal shows brilliantly.

"Another receipt I got hold of while down in the country was a method of fire-proofing wood. I was down in Sam Holsten's shop one day and saw him painting the wood work near the forge with a mud-colored paint and asked him why he didn't whitewash the inside of his shop, instead. He then told me he was fire-proofing the wood. His method of treatment was as follows: He first made a solution consisting of three parts of alum to one part of copperas and dissolved it in water. This he applied hot to the wood in three coats, allowing just enough time between coats for the solution to soak in well. This treatment is then followed with a mixture consisting of a copperas solution mixed with fire clay until it is of about the consistency of paint. This treatment Sam says will not only make the wood practically fireproof, but will also preserve it."

"That's good, Benton," said the Editor. "It should interest our readers very much."

"This same smith gave me a good hint on whitewashing, that I think will be of value to our folks. You know whitewash has a tendency to flake off. Well, in order to prevent its flaking, he mixes one quart of fine Portland cement with each keg of whitewash. He says his whitewash barrel holds between seven and eight gallons. This mixture he says makes the whitewash stick to the wood. Of course, it is necessary to keep stirring the mixture while using it so as to keep it thoroughly mixed."

"Well, Benton, I think you've earned a good meal. If you haven't yet had your dinner I'll stand the expense." And, as Benton promptly grabbed his coat, the Editor knew that a second invitation would be unnecessary.



AN ADVERTISING CARD AND MR. FRED CORRELL HIMSELF

The Roads o' Life.

W. O. B.

(Bein' the reflexshuns o' a stage driver.)

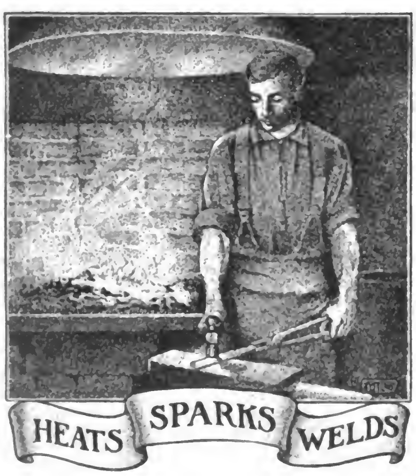
Las' nite—'t was arter supper, an' I'd red the papur thro'—
I sumhow got ter thinkin,' es a man'll sumtimes do—
O' the kind o' roads I'd travelled, an' it kem to me es how
Our lives was 'bout es different es the roads I learn'd t' know.

Sum lives air like a stony road thet's mighty hard t' team,
Thur's bumps, an' rocks, an' ruts, an' sech, by thousands it would seem.
Sum times the coach 'll pitch an' toss an' then thar is a spill,
An' then, agin, sum stages seem to live on Stony Hill.

Sum roads air smooth an' easy an' the stage jes rolls along
Es if thur wus no hosses nur a thing to pull it on—
The air is filled with sunshine an' it never seems t' rain
When yer stage is rollin' 'long a road like thet down to Loraine.

Thur's a road leads thro' the bad lands on the edge o' Devil's Crick.
It winds aroun' Crime Mountain where yer eye hes t' be quick.
Thur's an ever present danger es the stage creeps on its way—
Thur air lives es black an' gloomy es the road t' Hoss Thief Bay.

Each hes got a road t' travel, each hes his way t' go,
But when y' start jes choose a road like the best o' all I know—
It leads thro' Pleasant Valley, edges both the wood and crick—
Thur's lives thet's jes es hansum es the road t' Cristal Lick.



When one doesn't expect much, one generally gets what he expects.

Crush the dead beat before he crushes you. You can do it by organizing.

Uncle Billy Martin says: "Sum folks hes all thur holiness at thur elbows and trouser seats."

The quickest, easiest and most common way of killing character is to kill time. Character dies at the same time.

"I like my trade" the 'prentice said. "I like my bread and butter. But the part I like the best of all is to shut up shop for supper." B. H.

It's a good time right now to lop off unnecessary expenses and to prune the necessary ones. But don't prune so close as to kill the tree of business.

It may be the other fellow's fault if he never trades with you, but it's your fault if he doesn't continue as a regular customer after coming to you once.

Not too late even now to fix up stock, tools and supplies for the winter. Look about for needed shop changes—get busy on them when work slacks up.

It's better to turn over a new leaf and let it turn back than not to turn one at all. But it's best of all to keep it turned. Of course, that's what you are going to do.

You, of course, can't expect to get all the business all the time, but are you getting all you can get? You won't know it unless you go after it and with determination.

You can't make a dollar buy as much today as it did ten years ago. Then why work for the same prices you received ten years ago? You cannot do it and stay in business.

It's not alone the appearance of a job that tells its worth. More important than anything else is the amount of honest material and workmanship that goes to make the job.

Where do you stand on the Parcels-Post question? Are you content to let the Express Trust continue its robbery? Or have you told your representative that you want Parcels-Post?

You never did and never will see a quack medicine, fake gold mine or other questionable advertisement in this journal. Such advertisers cannot buy space in THE AMERICAN BLACKSMITH at any price.

Don't be afraid to ask your helper for his opinion. Talk things over with him. He must know something or you wouldn't have hired him. And you'll find him a better helper for having asked his help.

One morning Tom heaved a big sigh;
Said: "At cleaning today I will trigh,"
But he soon changed his tune—
Locked his shop up at nune—
Went fishing with a jug full of righ.

No matter how little, put something by for a rainy day. It is surprising how quickly a little bit every day or week will amount to quite a good-sized sum. It will surprise you if you haven't ever tried this.

Catalogs—do you save yours? They are important books of trade. Have a place for them and keep them in place. Then you'll know where to look when you want to know the price of tools, machines or supplies.

Do you know that you can save a good-sized lump of money by taking advantage of our long time rates? The exact amount you save depends upon just exactly how much you want to save. Ask the subscription man about it.

Running a smith shop without THE AMERICAN BLACKSMITH is like climbing the stairs to the top of a thirty-story building when the elevator is running. You'll find it lots easier going with "Our Journal" as a smith-shop companion.

Are you getting your share of the money spent on automobiles? There's a big pile of it—also, there's no reason why you shouldn't get some of it. Read our auto department. It will show you how to gather in some auto money.

Our Friend Tom Tardy has discovered a new wrinkle for making holes in iron without drilling or punching. He describes his new stunt as follows: "Stick the piece of iron down well in the fire, keep the blast agoin' and then fergit the iron." B. H.

Your customer is the one and only person who profits on a cut price. When you cut prices you cut your profits, you cut into your competitor's business, you cut down your revenue, you cut down your chances of meeting your bills and, finally, the jobber cuts you off his credit list. And then you cut your business throat. If you are in business for your customer's profit, then cut prices.

It is not always a man's own fault because he is at the bottom of the ladder. But it certainly is his fault if he stays there. Progress is sometimes hard—in fact, exceedingly hard at times. But a man cannot prevent himself from making some progress if he keeps persistently and everlastingly at it. No matter how little you advance, count it as progress. How much have you progressed in the last year?

"I got a new job" said Jack to his best girl. "And it sure pays the proper wages."

"What are you doing and how much do you make?"

"I'm a blacksmith's helper. And the wages —well, you can figure it out yourself if they ain't pretty good. The man I'm helping uses a three-pound hammer and gets three dollars a day, while I use a hammer that weighs twelve pounds." B. H.

Don't try to know more about your competitor's business than you do about your own. Pay such strict attention to your own business that you won't have time to even think of your competitor. Then you never know you've got one. Don't knock your competitor—if he's bad enough to knock he wouldn't be your competitor. And then, too, every time you say a mean word about him you cheapen your self-respect.

Would you allow a man who knows nothing about the interior arrangements of your body to cut and hack at your foot in an effort to cure an injury? Yet some men who know little or nothing about the interior of the horse's foot pose as horseshoers and, what is much worse, get horses to shoe. We are glad to say that "Our Folks" know something more about the horse's foot and leg than what can be seen from the outside.

The oily tongue of the sharper is always at work, and he doesn't except smiths when he picks out victims. The fake subscription agent is, it would seem, continually with us—be careful in subscribing for any magazine. DONT, under any circumstances, give money to a stranger unless he can show proper credentials, and even then it's safer, folks, to mail your remittance direct to the publishers. Look out, folks, we don't want you to lose any money.

American Association of Blacksmiths and Horseshoers.

Some craftsmen will perhaps learn of The American Association of Blacksmiths and Horseshoers and its work for the first time when they receive this copy of THE AMERICAN BLACKSMITH, and to these craftsmen a word of explanation is due.

The object of this movement is to band the smithing and vehicle craftsmen together for protection, for strength, for harmony. Other trades and professions have the protection of co-operation and organization, why not the smithing craft? There is no reason why the smith, the horseshoers, the vehicle workers cannot get the same protection if rightly organized.

Already numbers of branch associations have been organized. Counties have co-operated and formed state associations and the state organizations are getting the needed laws for the protection of their members. There is practically no limit to the benefits to be gained through organization and co-operation. Better prices can be agreed upon, dead-beat and slow-pay customers guarded against, united action gotten on needed legislation, and other benefits too numerous to mention. The force of combined effort is wonderful, and when the object sought is of such great benefit to the craft, not one single member of the trade should hesitate to lend his aid and support.

If you cannot claim the benefits of an organization in your county address me, P. O. Box 974, Buffalo, N. Y., and by return mail will come my easy plans for organizing branch associations. A postal will do—but write right now, before you forget all about this. A movement started in your county now will net you full benefit during the spring rush.

THE SECRETARY.

Re-Painting Vehicles in Horseshoeing and General Repair Shops.*

W. A. BIGGLEMAN.

At this time of the year there is very little re-painting to be done, in fact, none; therefore, this is the time to fix your shops; repair the floors, windows, and doors—put in more lights where they are needed. Arrange your flats, runways and elevators so that you can get your work in and out easily. If you are going to stay in the re-painting business, increase the size of your shop, for you will have the automobile to re-paint. Your workshop isn't big enough anyway when you get plenty of work in it, is it?

This is the time of the year to advertise for next season's painting, before someone else gets ahead of you. See your customers now. If you have a painter, or do the work yourself, one of the best ways of doing the job at present prices is this: When you get in the work to re-paint, always unhang them. Do not try to paint same unless you do. It makes no difference what price you are going to get for the job—the fact a quick way to re-paint and make the job look well. Be sure to wash your bodies thoroughly, also beat all the dust out of seat-back before starting to paint. Do not, however, take the seat from body, as there is no time for that.

For a re-varnish job, use this method: Rub the old varnish with pulverized pumice stone, then clean up well. Do not touch up with drop black, as was formerly done—cut that out. Instead, put on a coat of solid covering color varnish. This will cover well when dry. Rub it, clean it well and touch up if

With apologies to Farm Implement News.

NOT YET, NOR SOON; BUT SOME DAY, MAYBE

that you can do a better job by using this method should be sufficient. Next in order is to number your jobs. Enter in your repair book the number, your customer's name and all the necessary directions as to what is to be done with the job, such as price of painting and other repairs, if any, when the job came in and when it is to go out. Or have some repair tags made—these are really the best thing in a repair shop.

In beginning the work, always start painting the body, as it takes more time to paint a body than a gear, though you must not tarry long on either, for the people of today are living in a hurry and have not long to wait for a painter to do a job. Therefore, you must learn

needed. Finish with a quick drying body varnish. Have a varnish that works well. Do not have a varnish for which you have to wait while the runs dry out to finish over. You have no time for that.

Now for the gears. Clean them thoroughly, then rub or sandpaper them. You need not touch up or cover the old stripes, as of old; but simply get some solid covering color varnish and cover with a good, even coat. When dry, moss or hair, then stripe and finish. Also, get a good gear varnish—one you can rely on. This is one of the best methods and the quickest for the money.

Now for a medium job of re-painting. Do your bodies first. Sandpaper them

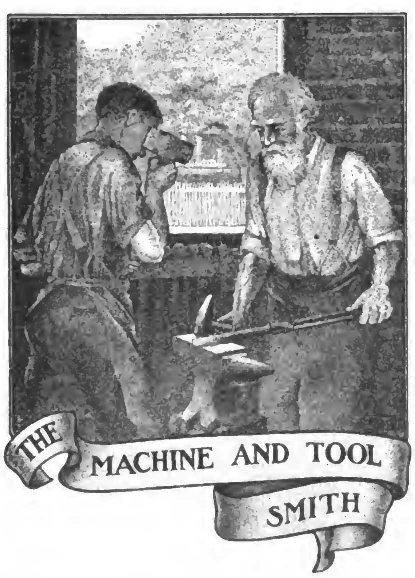
* This is Mr. Riggleman's second paper on vehicle painting in the general shop. A third installment will appear in an early issue.

well all over, leaving seats on. Next, give body a coat of lead, with dry, rough stuff in it to color it—a little Japan, very little oil, mix all together in a stiff batter and thin with turpentine, ready for use. When this coat is dry, putty or glaze all over, if needed. When dry, do not sandpaper if you have puttied your body smooth. If not, then, of course, sandpaper. Give body another coat of rough stuff—four coats in all—including the first coat. Rub the next day, after you get the last coat on, using ready mixed rough stuff, as it is the best. By using it you can put two coats on in a day, if you wish. After you have rubbed the body lightly with rough stuff, sandpaper it lightly, but do not use the old method of giving a coat of color. Simply give the job a coat of the strong or solid covering color varnish black; then rub and finish. If you get the price, give the job another coat of rubbing varnish, half black and half clear. Always buy a good rubbing varnish—one that dries quickly, rubs well and will do good service.

For the gear to a medium job, wash up well, clean the gears and sandpaper. On the first day, simply lead the rims and bare spots with a lead that does not contain much oil. Beware of too much oil. Next, putty the rims and holes. When putty is dry, sandpaper. Then give the gear or chassis a coat of dead lead all over. Mix same with keg white lead, or, if to be black, use dry lamp black to color. Now mix a little Japan and oil, or rubbing varnish, thinned with turpentine; put on a coat of this with a camel's-hair brush, so that you can give a heavy, smooth coat. When this coat is dry, moss and give a coat of solid covering color varnish. When last coat is dry, moss and stripe and finish with the same body and gear varnish used on the re-varnish job. By putting more rubbing varnish on a job started this way you should have more money for your re-painting. Start all your re-varnish, medium and other cheap jobs in this way. Make the difference in price by putting on extra coats of rubbing varnish, as you have the old foundation with which to start. All that it is necessary for you to do is to hide a fine crack with your rough stuff. Putting on plenty of varnish is what holds up a job of painting.

This method of re-painting saves time and stock. This solid covering color varnish is the very stuff for small shoeing shops that do general repairing, and which take in spokes, rims, shafts, wagon, wood or iron work to be painted. You can buy the varnish in pints, quarts, half gallons or gallons. The small cans are the best for small shops, as it will not then dry up before you use the entire can. The solid covering, made by regular varnish manufacturers, is the best, as it dries quickly and firmly, and is made out of good rubbing varnish, not like the so-called one-coat carriage paint, which you buy at drug stores, and which never dries. All carriage painters who have ever tried to re-paint a job which has been painted with the "drug-store, one-coat carriage paint," can tell you that it never dries. Therefore, purchase your solid covering color varnish from a regular varnish maker. They make all colors and shades, or you can order any color you wish. It will dry while you are talking to your customer, and it will not gather up dust while he is going home.

MR. R. L. KEEFE RUNS THIS GENERAL SHOP. HE HAS A 6-HORSEPOWER GAS ENGINE AND IS LOCATED 12 MILES FROM A RAILROAD



Casehardening: the Materials, the Work, the Equipment and the Product.*

J. F. SALLOWS.

Casehardening is one of the most important arts of the present century and is practically in its infancy. In fact, the automobile industry is responsible for it being brought so rapidly to the front. High carbon or tool steel was formerly used when a hard piece was wanted to resist wear, but this would not resist the shock, owing to its being hard all the way through. What must be had is a hard case and a tough or soft core. Fig. 1 shows a glass-hard case, about $\frac{3}{16}$ inch deep, which resists wear, and a soft core which resists strains and shocks. Now, where a great deal of trouble exists is in the condition of steels prior to the casehardening process. For instance, steel of a low carbon content is better for carbonizing than steel of a high-carbon content. The grain of the former is more open and it takes up the carbon from the packing materials more freely than if the carbon content is high. From twelve to fifteen-point carbon is about right for gears and such parts as are not used for ball races. Parts that are ground after hardening and used for ball races should be about twenty-five to thirty-point carbon, as it is much easier to obtain a glass-hard surface on this grade of steel than on a low grade.

The test the automobile manufacturing concerns are giving now consists of scratching with the end of a file. They break a small piece from the end of a file, so as to get a real sharp point to scratch with. This is a very simple matter for the tester, or scratch-man, as he is sometimes called, but how about the fellow who has to make the parts hard enough to resist this test when, perhaps, the grade of steel is not adapted to it? Fig. 2 shows a piece of steel that was glass-hard before grinding, but showed checks, and on breaking was found to be quite brittle. The trouble was in the grinding. The parts were ground "piece work" and were ground dry and, as shown in the engraving, the case is almost torn loose from the core.

There is more trouble caused in the grinding of the parts after hardening than there is in the hardening department, but the blame is generally laid to the hardener or the steel. So many overlook the poor, innocent grinder who sits on a nice, soft cushion and grinds the parts until they would blister your hand if you touched one. I have seen parts made quite hot while being ground, and the fellow had to pour water on them before removing them from his machine. There is really no need of being careful in the hardening department

* This is the first of Mr. Sallows' articles on Casehardening. The second will appear in an early issue. Mr. Sallows is foreman of the Casehardening Plant at the Reo Motor Car Works.

when there is such carelessness in the grinding department.

A few things of the utmost importance to consider along the casehardening line are: The proper kind of furnace to do the carbonizing with; the proper kind of furnace for reheating; the proper kind of bath or quenching tank and, last but not least, the casehardening materials we should use. While this article is not an advertisement I am going to state just what I have used and what I consider best adapted to the work. I believe the Brown & Sharpe coal-burning furnace for carbonizing is at the top of them all. It is a clean

FIG. 1—A HARDENED CASE, MEASURING THREE SIXTEENTHS OF AN INCH

method, and we can keep a uniform heat all week or all month long if we want to. For instance, if we place some work in the furnace at 6 A. M. and wish to carbonize for twelve hours at 1600° F., we fire up at noon and again at night. Our work is ready to remove at 6 P. M., and if we refill at 6 P. M. we can remove again at 6 A. M. But twelve hours is hardly necessary for a good class of carbonizing. Seven hours is plenty, unless a very deep case is required, then eight, ten or twelve hours is all right. Fig. 3 is a sample of twelve-hour carbonizing and would have been a very good job if it had not been spoiled in the reheating. This we will explain later.

Now, about the carbonizing temperature. Some go as high as 1800° F., and some as low as 1500° F. Some carbonizing materials require a high heat, while other materials will act at a much lower

FIG. 2—A PIECE MAY BE HARDENED CORRECTLY BUT SPOILED IN GRINDING

heat. Also, some steels will not carbonize at less than 1750° F. or 1800° F., while other steels will carbonize at 1450° F. I believe the lower the heat at which we can carbonize the better for the steel, and the furnace and boxes as well.

Now about reheating; this is a very important feature which is overlooked by a great many. For instance, compare

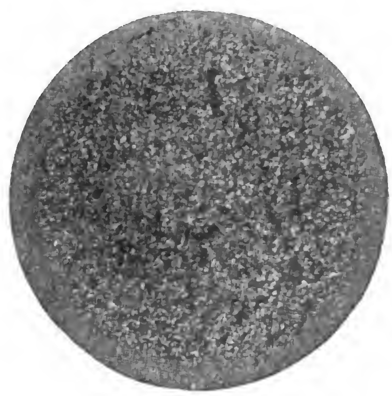


FIG. 3—REHEATING MAY ALSO SPOIL A GOOD PIECE OF WORK

pieces 1 and 2, Fig. 4. Both are cut from the same bar of steel and carbonized in the same box for the same length of time. No. 1 was dumped directly from the furnace into the bath at carbonizing heat, while No. 2 was allowed to cool and was reheated at 1450° F., then quenched. The results are plain. One does not require a very strong glass to see it, either. Careful reheating is the only way to get results. If we carbonize at 1650° F., we should set out and let cool. Then set boxes back into reheating furnace at about 1400° F. or 1450° F. Let them remain for about two and a half or three hours, then dump into cold water, and you will have a job to be proud of. Any kind of a gas or oil furnace will do for reheating if we reheat in boxes, as should be done if we want a glass-hard case.

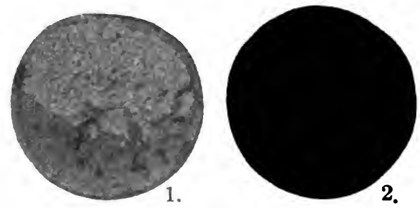


FIG. 4—SHOWING WHY CASEHARDENED WORK SHOULD BE REHEATED

Fig. 5 shows two boxes at about 1450° F. reheating in the same material in which they were packed for carbonizing. The results were great. Fig. 6 shows a batch of gears being reheated in an open furnace. This is very wrong, as you simply undo all you have done. The gears will scale, oxidize and decarbonize and will have a soft case. They should be kept from the air while heating, and the best way is to pack them in boxes, using either charcoal or charred leather or the same material used in carbonizing. But, by all means, *do not* reheat in the open furnace, as shown in Fig. 6.

An oil bath for gears is shown in Fig. 7 and is about as good as anything used by the writer. It consists of a large tank made from $\frac{3}{16}$-inch boiler plate, about 36 inches wide, 36 inches deep and 50 inches long. This is the water tank, and

FIG. 5.

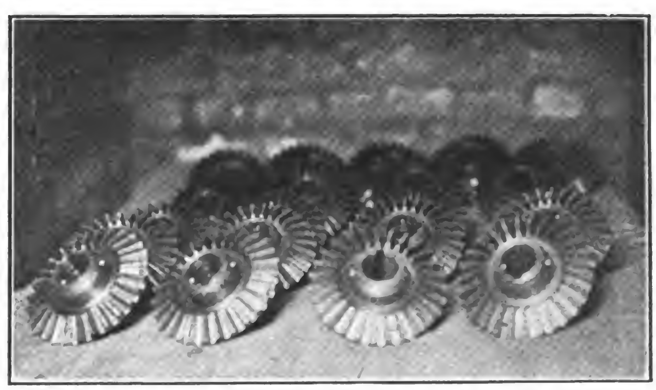


FIG. 6.

THERE IS A CORRECT AND ALSO AN INCORRECT WAY TO REHEAT CASEHARDENED WORK. FIG. 5 SHOWS THE PROPER WAY TO REHEAT, WHILE FIG. 6 SHOWS HOW NOT TO DO IT

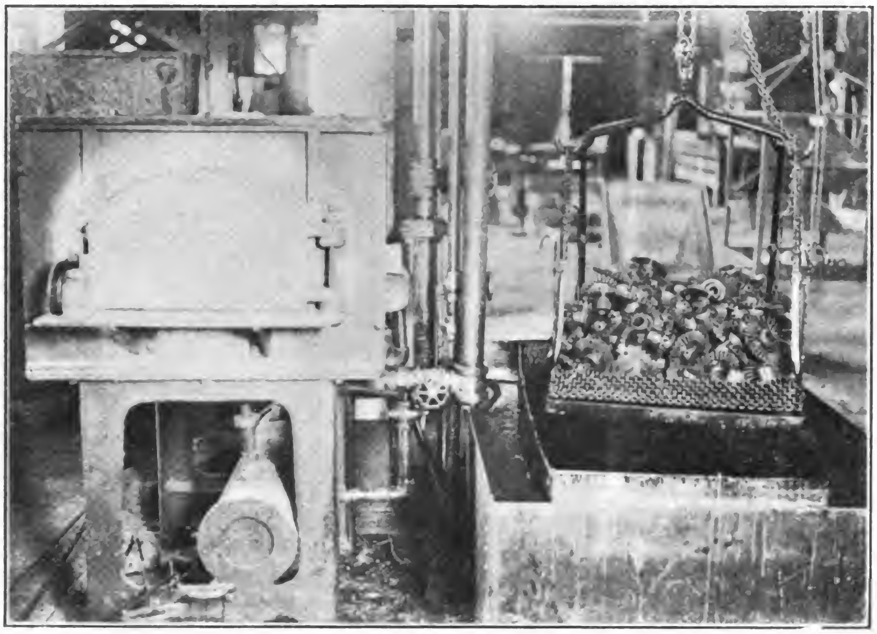


FIG. 7—AN OIL BATH WITH ITS BASKET RAISED—A MUFFLE FURNACE IS SEEN AT THE LEFT

is the one shown on outside. The inside tank is 12 inches smaller each way and is filled with fish oil. We have two inlets at opposite corners in the bottom of the water tank and two overflows at opposite corners at the top. We also have a drain at the bottom. This gives a large body of cold, running water that surrounds the oil tank. The batch of gears on the sieve shown in the engraving did not make the oil even warm and, as seen, there is quite a number of them. Another thing I want to call your attention to in Fig. 7 is the large sieve. This is raised and lowered by means of a chain tackle and is a simple job for one man, while if it had to be raised by main strength it would require three or four men to do it. The same engraving also shows a small muffle furnace, the handiest tool in a hardening plant.

A great many firms have trouble with soft spots on their hardened parts. They simply dump the contents of the box—carbonizing materials and work combined—into a barrel or box, as the case may be. The whole thing falls in a heap in one spot, as in Fig. 8. They have an inlet at the top of the barrel and an overflow opposite the inlet. Then they wonder why the parts are not glass-hard all over. The cold water comes in at one side of barrel and runs out at the other, leaving the warm water in the bottom just where it should not be. Then, again, the parts in center of pile in the bottom remain red hot for quite awhile after the ones on the outside are cold—thus the soft spots. This is not an imaginary case. The writer has visited large plants where they tried to do good work and were using just such an apparatus as the one described and shown in Fig. 8.

Figs. 9, 10 and 11 show three views of the one quenching tank—the only one

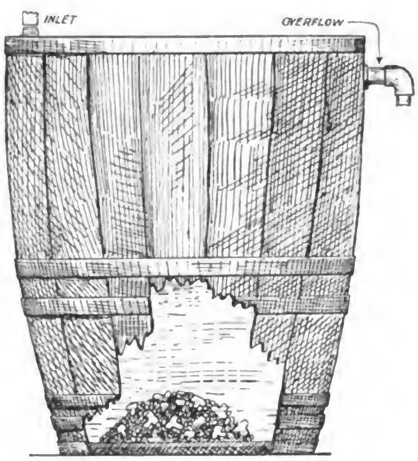


FIG. 8—SOME FIRMS WONDER WHY THEIR WORK IS NOT UNIFORM

of its kind in operation, up to date. There is a patent pending on this tank, but that won't hinder the readers of this Journal from looking it over, and we also show you working drawings for your guidance if you wish to make one for your own use. We will describe them later in this series of articles. This tank is known as the Sallows quenching tank for casehardening. Fig. 9 shows it ready to receive the parts from the box. Now see Fig. 10. The box from furnace is placed on shelves, A, and the contents dumped on sieve, B. The packing materials fall through into pan, C, by way of hopper, D, but the parts to be hardened slide down into the water, and are kept on the move by means of slides, E—three in number. These slides are made of perforated metal and scatter the parts in such a way as to have them perfectly cold by the time they reach the basket, F, at the bottom. This basket is also made from perforated metal. The tank proper is 36 inches deep and 24 inches square, and the telescoping frame which supports the slides and the basket fits tank so close that the smallest article cannot escape between the basket and the tank. The frame is raised and lowered by means of a small chain tackle, and one man can raise the entire contents of a large furnace easily with one hand. The hopper and screen, part A, B and D, can be removed from the tank by simply lifting out. There are four lugs on the tank to hold these parts in place. These lugs can be seen at A, Fig. 11. Here we also show another sieve to hang down into the tank to hold heavy pieces that are to be hardened. If firms who do casehardening would use such tools as the ones shown here their trouble with soft spots would soon be over.

Another mistake a great many make is in using very heavy boxes. The writer has seen boxes used where it took two men to lift them when empty. Such boxes absorb the carbon in large quantities and require a longer time to heat through. Light boxes would be better in a great many ways, and the men on the furnace job would remain longer if a little consideration is shown them. Nothing "plays hob" with the hardening department like changing hardeners every few weeks.

Fig. 12 shows a pile of boxes kept on hand in one up-to-date hardening plant. The thickness of the metal in these boxes is not more than ¼ inch, and the sizes of boxes range from 4 by 4 by 6 inches to 12 by 12 by 24 inches. Another good feature in favor of the light box is the

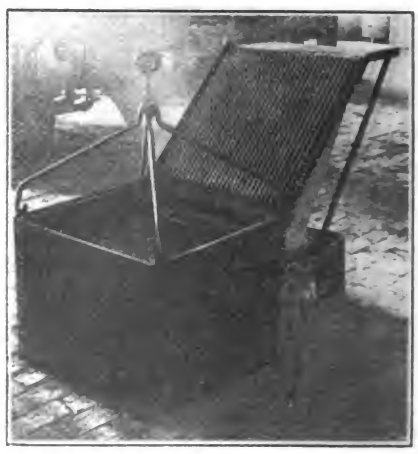


FIG. 9—THE QUENCHING TANK USED BY MR. SALLOWS

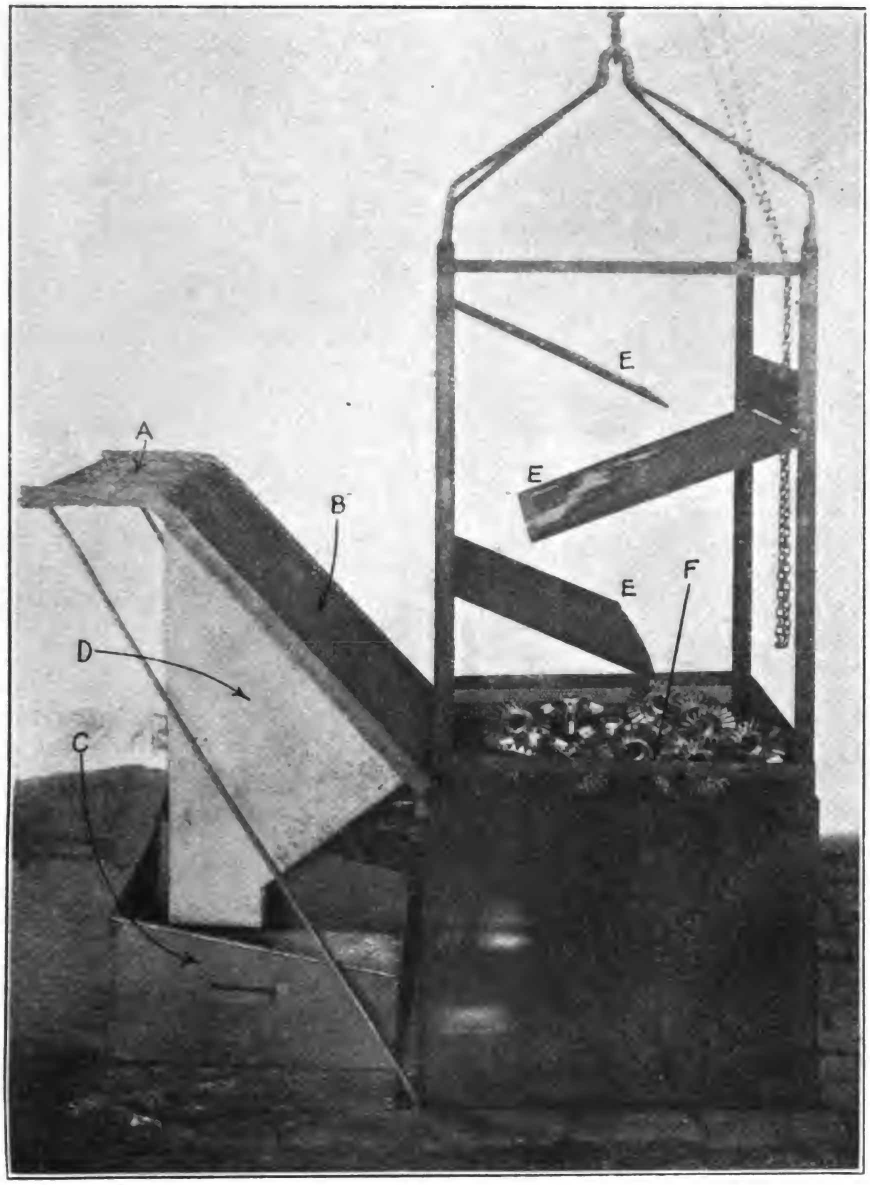


FIG. 10—THE INTERIOR FRAME OF THE TANK IS RAISED TO SHOW THE SCREENS AND BASKET

price. Being bought by the pound you get three or four light boxes for the same price as one heavy, clumsy one. When removing the boxes from the furnace the usual way is for two men to get hold of a box with long forks or tongs and lift until they are nearly blind and, after knocking the cover loose (which should not be done) they manage to get it on the floor, where it is sure to be in someone's way before the day is over. Then, when it has to be placed back in furnace for reheating, the same lifting and lugging takes place. Now this is all uncalled for. Trucks can be easily made, as shown in Fig. 13. Those shown are made from 2 by 2-inch angle iron, with large casters riveted to the angle iron and a light boiler plate top fastened along one end and one side, leaving the other side loose for expansion. The weight of boxes will bring the top straight. These trucks are run up to the furnace door, boxes are drawn out of furnace onto truck and the truck is then run to some part of shop where the boxes can cool off and at the same time be out of the way of everything and everybody.

Another recommendation is not to have any wooden boxes around the hardening department. We should use metal baskets for handling the parts and have large metal cans or bins to place the parts in after they are ready for the grinding department. Fig. 14 shows a splendid system of this kind. When the trucker comes along, if any parts are in the cans he takes them, and if nothing is in the cans he asks questions of no one. In this way all work is cared for very promptly and without any interruption. It keeps the work moving right along to completion. In our next installment on casehardening we will go more fullly into the proper grade of steel to use, also the time and temperature.

(*To be continued.*)

Some Thoughts and Experiences on Steel and Steel Working.

E. R. MARKHAM.*

In the history of machine-shop practice there has never been a time when so much attention has been given to the selection of steel as at present.

Many large factories employ one or more chemists whose duty it is to "keep tabs" on the various materials used in the factory. The duties of the chemist differ in the various shops. In some factories he makes chemical tests of a certain number of bars of stock from each shipment, entering the result of each analysis in a book, or in some way recording it, so it can be referred to any time.

In some factories all stock is bought by specification, subject to analysis, or to analysis and physical test. If it does not meet the requirements as specified in the order it is rejected and returned to the steel mills.

In many of the larger factories samples of the various steels on the market are tested in competition with each other. This is especially true of the high-speed tool steels used in the rapid cutting of materials. The testing of these steels may or may not be under the supervision of the chemist—custom varies in different shops.

While there is an attempt made in many shops to get by actual experiment and by chemical tests the steel best adapted for the purpose, the methods taken many times defeat the end in

* Mr. E. R. Markham is the author of "The American Steel Worker," and a steel expert of some 30 years' experience.

FIG. 12—CASEHARDENING BOXES NEED NOT BE HEAVY AND CLUMSY

view. For example, four steel concerns submit samples of their steel for test. As a rule the steel is in the form of tools ready for use. Now, it is a known fact that there is not so much difference in the ability of various leading brands of high-speed steel to produce work as one might think, if he listened to the claims of one steel salesman.

The ability of a tool to produce work depends in a great measure on the form of the tool. Two tools made from the same bar, cut from the same end of the bar and with the cutting portion on the ends that were together when in the bar, may work entirely different, even when used under exactly the same conditions in removing stock from the same piece of material. This is as true of tools made from common carbon steel as of those made from high-speed steel.

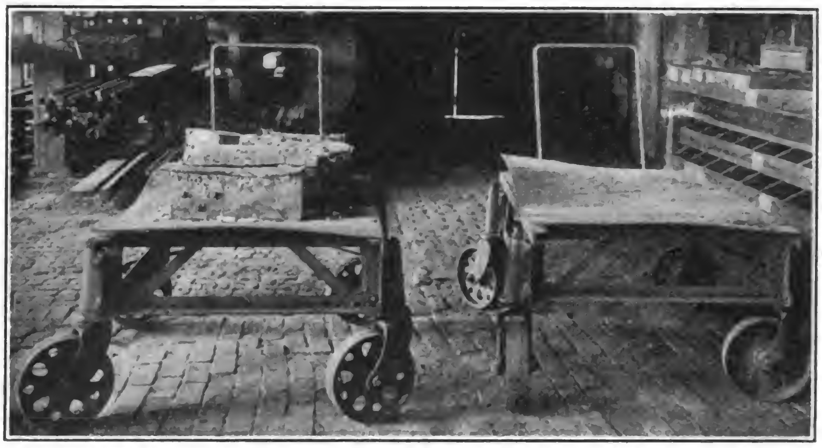


FIG. 13—TRUCKS GREATLY EASE THE WORK OF DRAWING BOXES

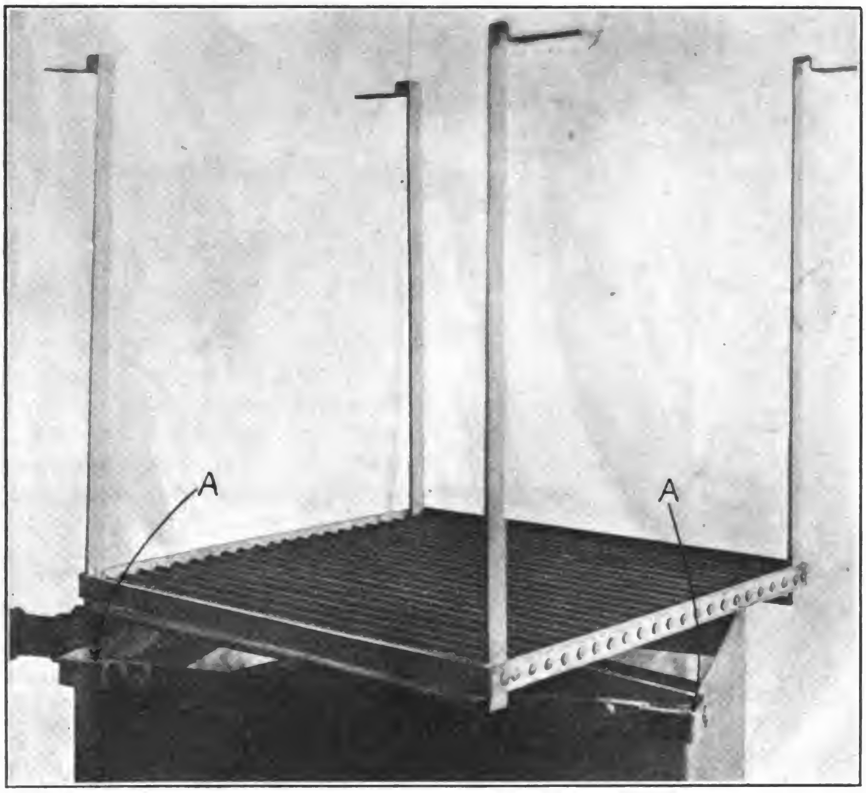


FIG. 11—FOR HEAVY WORK A HEAVY SIEVE IS, OF COURSE, NECESSARY

Very few of the steel concerns send out as representatives men who understand cutting tools, or steel. Many times the representatives are selected on account of their personal appearances or their ability to "put up a bluff." Fortunately, the "bluff" business is being called much oftener than was formerly the case, and some concerns realize that it is necessary to send out representatives who actually understand the business they represent.

A man familiar with the action of cutting tools, who knows how a tool must be shaped in order to accomplish certain results and who knows how to harden steel for results, is an invaluable man to represent a steel house. I recall a man sent to a shop at which I was employed at one time to show us how certain articles, made from steel furnished us by their concern, should be hardened. It was apparent that he knew nothing about the heat treatment of steel, and still less about the metal itself. After wasting a lot of valuable time we informed him that we could not spare time when no results were forthcoming. Another man was sent, and he knew less than the first one—if such a thing were possible. His visit was followed by one from the vice-president of the concern—a man who thoroughly understood the business, and the investigation which followed confirmed our contention that our method of treating the steel was all right, but the steel itself was not adapted for the purpose. In the meantime we had become disgusted and had transferred our business to a concern that gave us steel of the desired analysis

FIG. 14—A SIMPLE SYSTEM THAT INSURES WORK BEING CARED FOR PROMPTLY

and which gave us the required results. So, our trade, which amounted to quite a number of tons per year, was lost to the first concern because, instead of giving us the article ordered, they attempted to convince us by means of an ignoramus that we did not know what we wanted and that results were lacking because we did not know how to properly treat the steel.

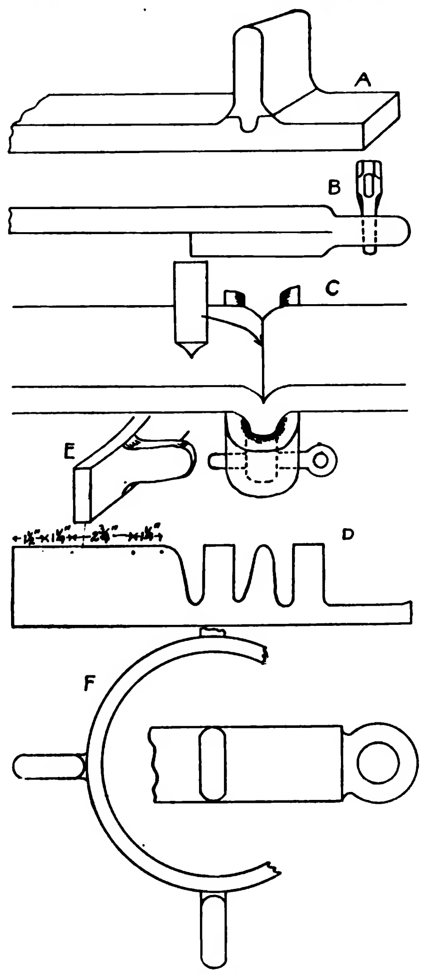
We stated that the shape of a cutting tool had a great deal to do with the success of the tool. I saw a lathe tool used in roughing down an axle, made from crucible machinery steel, which would not stand up when in use. It was hardened several times without improving in any way its staying qualities. An examination of the tool showed that it did not have sufficient clearance, and was rubbing against the bar just below the cutting edge. When given about ten degrees more clearance it worked nicely. I have found this a very common fault with tools made from high-speed steel. The party making the tool, wishing to have it as strong as possible, failed to give it sufficient clearance to prevent its rubbing underneath the cutting edge.

(To be continued.)

Three Ways of Forging Lug Bands.

BERT HILLYER.

In shops where ship smithing is done there oftentimes occur discussions as to which is the best method of making lug bands. There are five different ways of making these bands, but, as it takes time and space to describe them all, I will confine myself to the three best ways of which I know. Each method is governed by the tools and the material which you may have at your disposal. If in a small shop and it is necessary to forge the lug band on the anvil and the stock from which it is to be made is wrought iron, the band is made of, we will say, 1 inch by 4-inch stock, the inside diameter to be 14½ inches. To find how far apart the lugs are to be and to find the circumference of the band, we add the thickness of the band—1 inch—to the inside diameter and multiply by 3$\frac{1}{7}$, which is equal to 48⅝ inches. Divide this number by number of lugs on the band. In this case we are estimating four—so we have 48⅝ divided by 4, or 12$\frac{5}{32}$. This gives the distance between centers for each lug. In cutting off the iron, leave it long enough to upset well where you are going to put the lugs, then start 6½ inches from the end. After upsetting, drive fuller in across the iron, about ⅜ of an inch deep. Take a piece of 1¼ by 4-inch iron and cut off four pieces 5½ inches long. Heat up one end to a good heat and fuller each side of the piece so that the center is raised up and we have a lip each side of the center. The engraving at A shows lug fitted in, ready to weld. Have another fire to heat the lug for welding, but pick out a smith whom you can trust in taking a good clean heat. When both pieces are at a good welding heat have the other smith place the lug on the band, as at A, and let the two helpers drive it down with good hard lively blows. Then each smith should take a fuller and weld up the lap nearest to him. This makes a helper striking on each side of lug. Next, heat up to a light welding heat and bend the band where the lug is welded on. This is best done by turning it over with end of lug and on top of anvil, putting broad



THERE ARE A NUMBER OF WAYS TO FORGE LUG BANDS

fuller directly over center of lug. This gives the radius in that spot where it would be difficult to bend. The rest of the lugs are made the same way; the distance between the centers of lugs being 12$\frac{5}{32}$ or 12⅛ inches. (This latter measurement will do.) Finally, cut the band 6 inches from the center of the last lug and bend around and weld.

To make the band of soft or mild steel it is best to double the stock over in making the lugs. In figuring out stock use same computations as in making the wrought iron bands, except that 5½ inches is added for each lug that is doubled over. This doubling is done by partly cutting through the steel with a hot chisel in order to make it bend easily and in the right place. After bending it over we weld up 2¾ inches. This, when drawn down, makes a lug 1$\frac{5}{16}$ by about 4 inches long. A quick way to make this band is to punch the hole and make the eye when the lug is straight, as at B. After this is done heat up again and put eye in bolster and spread apart. This bolster is simply a piece of 1½ by 4-inch iron, bent in a U-shape, with inside corners rounding. A hole is then drilled through the side for a pin which is slipped through eye of band when put in block, C in the engraving. After bending out the piece, as seen in the engraving, a V-shaped piece is made of soft iron, the band heated up to a welding heat where it is spread apart, a soft heat next taken on the V-piece, the lug put in the bolster and the V-piece welded in. Treat all the lugs in the same way, then bend and weld.

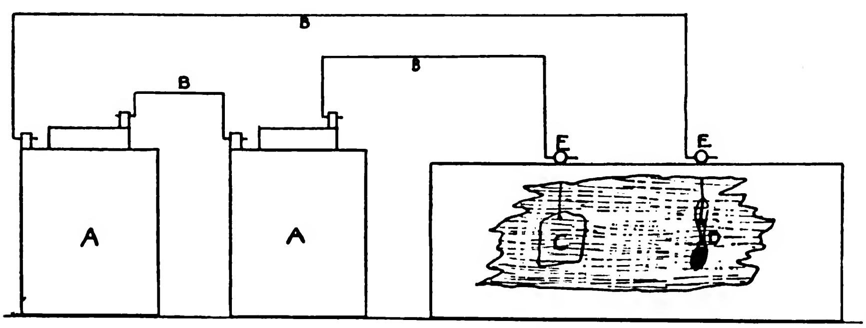
To make the same band with a steam hammer, take a piece of 4 by 4-inch mild or soft steel, figure out the cubic inches that are in the finished band and then lay same amount out on the 4 by 4-inch stock. If the band is 1 by 4 inches and is 48⅝ inches long before it is bent the cubic contents will be 1 by 4 by 10⅞, or 338½ cubic inches. The lugs will figure 1¼ by 4 by 4, or 20 cubic inches, as one lug, or 80 cubic inches in four. In the entire band there will then be 80 cubic inches plus 338½ cubic inches, or 418½ cubic inches. If there were 12⅛ inches between the centers of the lugs, and the lugs are 1¼ inches thick, 12⅛ less 1¼ leaves 10⅞ inches between the lugs. The cubic contents between lugs must then be 1 by 4 by 10⅞, or 43½ cubic inches. In the 4 by 4 there are 16 cubic inches in one inch of length; therefore, we mark off and fuller in, as in engraving at D. The only difficulty in making a band this way is in drawing out the short distance between the lugs at the beginning. To do this, turn the band over and let the part to be drawn out rest on a 3-inch square block; lay a piece of round on and drive down. This will help to lengthen out the stock. Next, turn the piece over and work out by using block on top. A double fuller should be used when blocking down

lugs. This is made by rounding the edge of a piece of ¾ by 3-inch steel and bending in a U-shape, making it 1¼ inches inside at bottom and 1⅜ inches inside at top for clearance. This should be welded to keep from spreading apart. The reason for using so narrow a fuller is that it does not drag the metal down with it as a broad fuller would, and thus reduce the size. After drawing out to the right size, bend around and weld; then heat up lug and draw it down to 1¼ by 2½ inches, making it rounding on the edges. A slot is next made lengthwise in lug and swelled out into a round eye. This is put into a spring tool for making the eye rounding, thus completing the eye. True up band, and if band needs to be chamfered on the edges it can be done with a very shallow tool, made like a half swedge.

How To Do Electroplating.*

A READER.

As the winter months are coming on and work is getting pretty slack a great many readers will have a lot of spare time. Last year I gave the workings, in a way, of the Royal process of plating, and was really surprised at the number of blacksmiths interested. I received letters from all over, and it kept me buried in answering them. However, I think I answered all I received. I have on hand, I suppose, a thousand or more letters asking when I was going to give the directions for the electric plating outfits. Well, I have not had the time, but I am now caught up and will give full working instructions right along in each issue till all the readers will be able to do good work.



THE OUTFIT USED IN ELECTROPLATING IS SIMPLE AND EASILY BUILT

As with everything else of this kind, plating is a very simple operation when you once get onto the working of it. And it is a money-maker, too. The main thing is to use care in preparing the work; that is, have the work clean and free from grease. I will first take up the making of the outfit. The most common plates are gold, silver, nickel and copper plate. The tanks in which the solutions are kept and in which the plating is done can be any size for the work required. A nice size for the nickel and copper tanks would be about 12 inches deep, 14 inches wide and 24 to 30 inches long. This size will allow you to take in almost any job that comes along. These tanks can be made of wood, preferably hardwood, and should be made perfectly tight and then painted inside and out with several coats of good asphaltum paint, the paint acting both as an insulator and also preventing the solutions from attacking the wood.

The silver tank should be made about 6 inches wide and 12 inches long and 12 inches deep. Although they can be made any size to suit your needs, it will not be very often that you will need a larger tank. For gold, the best thing to use is a glass or glazed stoneware dish that will hold about a quart, as a watch will probably be the largest article that you will get to gold-plate.

For the batteries I recommend that the liquid battery be used entirely, and it would require to carry on the operations about six of these batteries. You can get them from your jobber or from any electrical house for about 65 cents each, and after you once get them they do not cost much to use, the zincs costing you about 5 cents each, and a few cents worth of sal ammoniac will put them back as good as new when they play out. With the batteries you get full particulars for recharging them, or I will give that later. When you have your batteries and your tanks made, you will also need some bare copper wire, and for each tank you will need a couple of copper rods, about ⅜ of an inch in diameter and long enough to reach clear across your tanks. These rods lay across the tops of the tanks (see illustration) and are connected to the wires of the batteries. On one of these rods—the one which connects with the zinc part of the battery—you hang the article you wish to plate by a small piece of bare or uncovered copper wire, and on the other rod you hang a piece of pure metal—the same kind of metal as the plate desired; that is, if you want to copper-plate you use a piece of pure copper; for nickel, a piece of pure nickel, etc. These pieces of metal are called the anodes and may be procured from any dealer in electroplater's supplies.

You are ready then to place the article you want to plate on the wire, and your anode on the other, and let both hang down so that the solution will entirely cover them. Then turn on your current and let the electricity do the work.

I suppose you will get your outfit made, that is, that you will get your tanks ready and get your batteries, rods, etc., by the time your next paper comes, and then we will begin on how to prepare the work and also take up plating with copper.

As I said before, the anodes can be gotten from a number of dealers in electroplater's supplies, also the various solutions which come in powdered form all ready to dissolve in water and put in the vats. I forgot to mention that in making the tanks of wood do not put any iron inside of tank and *be careful that in nailing them together that the nails do not get inside, so as to come in contact with the solution.* This is a sure money-maker, if you follow the instructions.

* This is the first of a series of articles on plating as a side-line for the general smith. The second article will appear in an early issue.

Adjusting, Repairing and Caring for the Automobile—1.*

With Special Reference to the Packard Car.

The Gasoline System.

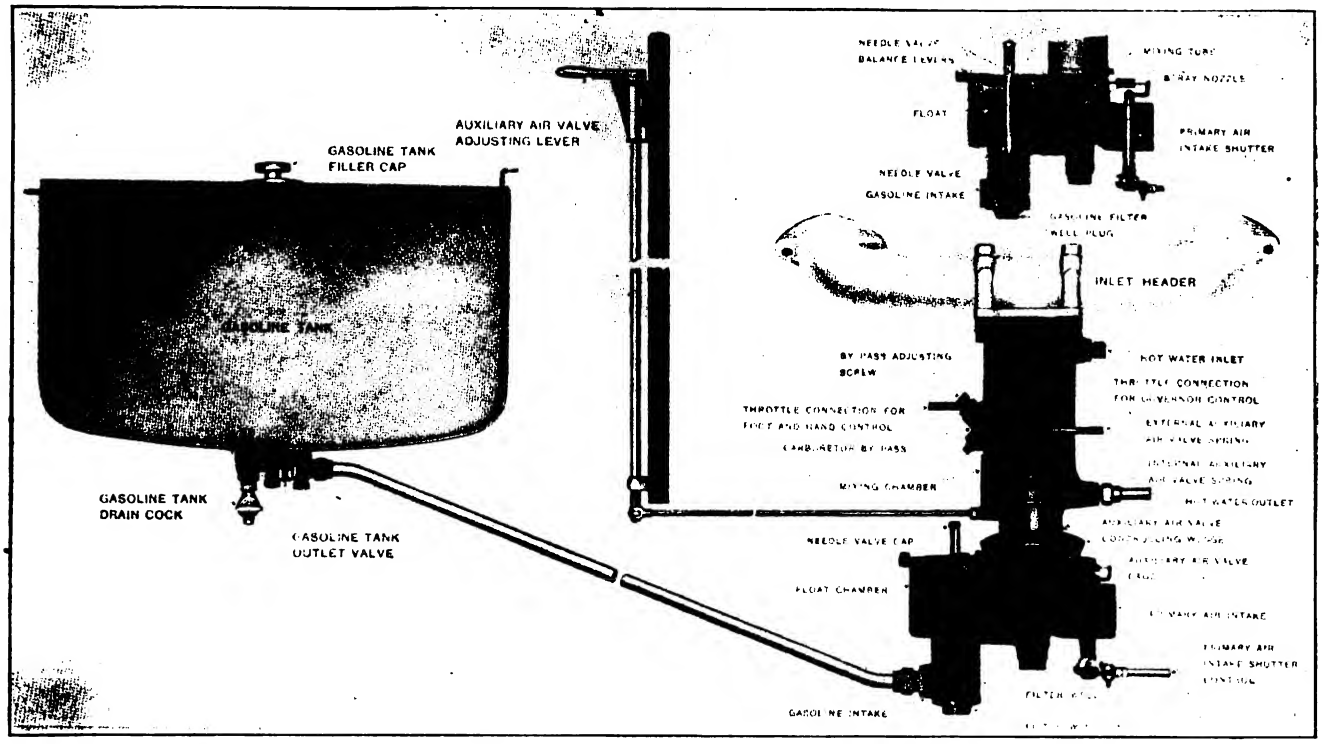
The gasoline tank, except in the runabouts, is located under the front, or

* The cars that have been described in similar articles are the Cadillac, Ford and Stevens-Duryea. Other standard makes will follow as information and illustrations are prepared.

driver's seat. In filling the gasoline tank, always pour the gasoline through chamois skin to free it from water and impurities. Except in the runabouts, there is, on the right side of the bottom of the gasoline tank, a three-way valve, which is controlled by a connection projecting through the right side of the car, below the front seat. When the valve is in the position marked "Open," gasoline is taken from any level higher than the stand pipe in the tank. This stand pipe gives the operator a reserve supply of about five gallons. Turning the handle to the position marked "Reserve" draws the gasoline from the bottom, nstead of from the top of the stand pipe, case of the "Thirty" phaeton the low front seat necessitates the tank being carried at a lower level than in the case of the standard chassis. Consequently, air pressure in both tanks is needed to insure the flow of gasoline to the carburetor when the car is ascending grades.

The air pressure for the runabout and phaeton gasoline tanks is furnished by an air pump, located on the motor crank case at the left of the Number One cylinder. This pump is operated by an eccentric on the exhaust case. The air under pressure is forced through suitable piping, past a valve on the hand air pump in front of the driver's seat and discharged into the gasoline tank. The relieve the pressure at the normal limit. In a runabout or phaeton which has been standing over night and become cool, an initial flow of gasoline to the carburetor may be obtained by gravity or by a few strokes of the hand pump. To obtain the former result, unscrew the filler cap on the gasoline tank, replacing the cap securely after motor is started. To prevent leakage of air from the gasoline tank, the filler cap on either a phaeton or a runabout should always be screwed down tightly.

There is no reserve supply or three-way valve on runabout gasoline tanks. The valve shuts off the flow of gasoline, or allows gasoline to flow from the entire



THE FUEL SYSTEM USED ON THE PACKARD CAR. HERE IS ALSO SHOWN A SECTIONAL VIEW OF THE CARBURETOR

and, hence, drains the entire tank. Turning the valve to the position marked "Shut" entirely shuts off the flow of gasoline from the tank. At the bottom of the gasoline tank, near the right end, is an outlet pocket which accumulates water or sediment. The small drain cock on this outlet pocket should occasionally be opened to drain off any accumulated water or dirt. The flow of gasoline from the gasoline tank, except in the runabout and "Thirty" phaeton, is by gravity. The flow of gasoline from the tank to the carburetor in the runabout and "Thirty" phaeton is obtained by air pressure. This feature is due to the fact that in the case of the runabout the gasoline tank is carried on the extreme rear end of the frame, and that in the hand pump in front of the driver's seat on a runabout or phaeton provides means of obtaining initial air pressure before the engine is started. On the dashboard there is a gauge connected, independently of the pumping system, directly with the gasoline tank, and which at all times shows the exact pressure in the tank. To obtain the air pressure by the motor air pump, turn the hand pump valve to a vertical position. This cuts out the hand pump, and is the normal running position. There is a relief valve on the motor air pump, which opens at a certain pressure, and thus prevents the pressure in the gasoline tank from rising above the normal limit of two pounds. The valve is provided with an adjustment by which it may be set to tank. The open, or normal running position is with the valve handle in line with the gasoline pipe.

The gasoline pipe from the tank connects with a filter well at the entrance to the carburetor float chamber. This filter well is provided with a screen, which should be removed and cleaned at least once a month. A plug at the bottom of the well provides for the convenient removal of the screen. The float chamber maintains a constant level, or supply of gasoline for the carburetor. The gasoline flows into the float chamber through a needle valve. The height of a copper float regulates the position of two balance levers, which, in turn, raise or lower the needle valve to gauge the incoming flow of

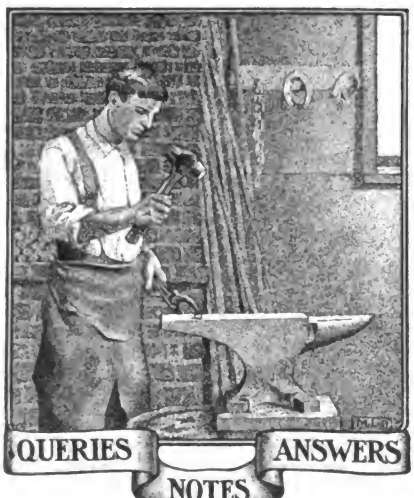
gasoline. If the float in any way becomes perforated, too much gasoline will reach the carburetor.

(*To be continued.*)

What To Do When You Inspect A Motor Car.

See that the compression in all cylinders is equal. If it is not, make it so by grinding in the valves or correcting other causes of leakage. Generally, the exhaust valve of the weak cylinder is the one needing attention. The distributor and the high and low-tension brushes of the magneto should be entirely free from gum and dirt. There should be no more oil on the distributor than may be applied by placing two drops on the finger and rubbing it on the contact surfaces. Clean the low-tension circuit breaker mechanism. Use gasoline for this and then put two drops of oil on the breaker stud and on the cam end of the breaker arm. See that the lower breaker contact point, which is backed by a spring, works freely and with no tendency towards sticking. Clean with gasoline if necessary. In this case, and also after cleaning the circuit breaker mechanism, be sure the gasoline is evaporated before starting the car. At the extreme width of break the breaker contact points should separate slightly over $\frac{1}{64}$ inch.

A GENERAL SHOP OF CALIFORNIA, RUN BY MR. W. B. HOUGHTON



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

Wants a Plating Outfit.—I would like to hear through your paper how or where I can get an outfit for silver plating, also what metals are used and where I can obtain them. A. READER.

Prices Before the War.—I should like to ask through our Magazine what the price of horseshoeing was before our Civil War, also the difference in those prices as compared to the prices and shoeing expenses of today. C. B. STAPLES, Maine.

Want a Tire Furnace.—I should greatly appreciate it if some brother smith would tell me how to build a tire furnace inside of the shop. One that would heat heavy tires, and in which I could use wood for fuel or one that would burn oil or gasoline.

EDWARD KENNEDY, New York.

Wants Information on Track Shoeing.—I enjoy the paper very much and I get lots of help from it. I would like some brother to write about track shoeing. That is my principal work as I am employed by a large breeding establishment.

TRACK, New York.

Wants to Build Modern Forges.—I should like to build a down draft forge in which the smoke and soot are carried off by the exhauster. I have a cellar under shop, and the forges are built clear down from first floor to floor of cellar. They are about five feet square and hollow.

BERT EHLY, Illinois.

On Rubber Tiring.—I am writing to ask you for some information about attaching rubber tires to vehicles. I am a good coach smith, understand welding channel tires and brazing thoroughly, and should be very grateful for the above information. FRANK O'NEIL, New South Wales.

Wants a Tire Heater.—I would like to hear from the readers of "Our Journal" the best way to build a furnace for heating tires and what material to use. The furnace to be large enough to take 4 feet, 10-inch tires down to 3 feet. Wood to be used as fuel. F. UNDERDOWN, South Africa.

Wants Wood Stock Information.—I have been at the horseshoeing trade all my life, but have done very little vehicle repairing, and wish to ask if someone would kindly tell me how to measure wood stock, such as felloes for wagons and buggies, tongues and spokes. What I desire to know is how to measure stock when ordering a bill of wood, and how to measure spokes.

CHAS. F. RAHN, Colorado.

Gets All He Can Take Care Of.—Some of the smiths would like the paper twice a month. Once a month is enough for me, as I do not have the time to read more than is in it. I read it through about three times and study it. I am learning a great many kinks about automobiles, as we blacksmiths living in the country must be able to repair them. I have had quite a number of jobs repairing them, myself. I am also interested in horseshoeing. To tell the truth, I like to read the whole paper.

E. V. BYERS, Pennsylvania.

Wants Plating Materials.—In one of the recent issues, one of the smiths said he made good by plating through the winter months. I should very much like to know where to get the materials used in plating: such as silver, nickel, etc.

HUBERT E. KANEHL, Kansas.

In Reply.—The following firms are handlers of supplies for plating by the electroplating process: Hanson and Van Winkle Co., Newark, N. J., Weston Electrical Instrument Co., Newark, N. J., Zucher, Levett and Loeb Co., 526 West 25th St., New York City. H. J. K., New York.

A Question on Well Drilling.—I should like to ask if some brother can tell me how to make a well-drill bit that will go down through the casing and drill a hole as large as the outside of coupling. I know the pipe or casing can be driven into common dirt, but when it comes to a rock the casing has to be made smaller, and so a smaller drill has to be used. Now, if the drill could be made to cut the outside of pipe or coupling, the casing would follow through the rocks also, and the well would not have to be made smaller. This is quite a study for me.

H. O. MADISON, South Dakota.

A Kentucky Shop.—My main forge shop is 20 by 35 and the machine shop 30 by 35. We have an 8-horsepower steam engine, which runs an 18-inch grist mill, a planer, a matcher and moulder, a rip saw, a 24-inch band saw, a spoke lathe, a belt sander and an emery wheel stand. I have two extra men to help run the machines. We have finished lumber to sell at all times. We build new wagons, repair engines and do nearly any kind of work that comes our way. I am away from the shop nearly all of the time, as I am in the lumber business some miles from home, but the shop pays.

N. B. SMITH, Kentucky.

Fast Shoeing and Plow Work.—I have carefully read the letter of E. E. Mann, of Ohio, in the October issue of THE AMERICAN BLACKSMITH, wherein he tells of a most remarkable day's work at shoeing. In one

of his statements he says he pulled the shoes, welded the toes, sharpened the heels and drove the nails on twelve shoes in forty-two minutes, making an average of three and a half minutes to each shoe. He claims he is prepared to send a sworn statement verified by witnesses. It appears to me like a pretty good day's work, and I don't think it can be beaten by anyone, though I would rather see the proofs.

What I should like to know is what kind of horseshoeing machinery he has installed in his shop. I enjoyed reading Brother Jewett's letter from Nebraska. His talk on those fifty lister lays turns the joke on C. W. Metcalf, instead of on the man who can sharpen the fifty lister lays.

NICK JACOBS, Kansas.

About that Rapid Shoeing.—In looking over the last copy of THE AMERICAN BLACKSMITH, I came across a letter from E. E. Mann. According to his letter he certainly is some "man" all right. Either he is a most wonderful workman or he would make a good candidate for some Ananias' Club. I have been shoeing horses for 25 years in different States and know what it is. I am also from Ohio, but when a man tries to tell me that he can pull off the shoes, dress the feet, weld on toe calks, sharpen the heels, nail them on and clinch, on an average of $3\frac{1}{2}$ minutes per shoe, then I am from Missouri, and will have to be shown. I wonder does Mr. Mann really expect an intelligent class of blacksmiths, such as the readers of our excellent Journal, to believe him or did he write it for a joke. I have sharpened and finished from 40 to 45 shoes in 5 hours, but I did not trim very many or dress the feet, and did not weld on many toe calks, but merely pulled off, sharpened and drove them back on.

CHAS. H. RAUSCH, Ohio.

MR. R. E. ECHROTE MAKES A SPECIALTY OF SPRING HAY WAGONS

A Question and Some Australian Prices.—As I intend to build a new shop next year I wish to ask some of my fellow craftsmen what is the best chimney to erect and also the best position for it, as I intend building three gables 17 by 30 each, one for shoeing, another for coach smelting and the third for wheelwrighting. I have already built one for painting, which altogether will give the shop four gables.

Our work out here is chiefly buggy and wagon building and shoeing. The population of the town (which carries two general shops and two shoeing shops) is 2,500. The Municipal Council is just starting to erect an electric power house and hopes to supply the town with light. Within three months it hopes to be in full swing. If the tools advertised in your paper could be purchased here as cheaply as in the United States I would have electric power installed immediately.

We have to pay the minimum wage to wheelers and coach smiths, which is 1 s. 2 d. (about $ .28) per hour. But a good workman gets up to 4£ ($19.50) per week. The shoer gets 3£ ($14.50); floorman, 2£ 12 s. 6 d. (about $12.00). The hours are 48 per week. Shoeing prices—light, per set, 4 s. ($ .98); heavier, 6 s. ($1.46); barred, 7 s. ($1.70).

JAMES R. SMITH, New South Wales.

On Welding and Tire Work.—In answer to Mr. S. E. Frazell, of Nebraska: 1. Iron or steel will weld with proper heat whether painted or galvanized. 2. Pole irons are malleable cast and run, but drop forgings are generally of soft steel. 3. A dished wheel should be held down with an eyebolt from the floor through hub and set up hard on tire while cooling. 4. A four-ton wagon should have $2\frac{1}{2}$-inch rim and a $\frac{7}{8}$ by $2\frac{3}{4}$ tire. Allow a draw for the front tire of $\frac{5}{8}$ inch at cherry red and the back tire at cherry red for $\frac{3}{4}$ inch. Joint space in rim should not be measured. Other tires in like proportion. 5. No, there is no sulphur in carriage paint. 6. Yes, smith coal contains sulphur. 7. Yes. The resultant element of sand is principally glass, but when used as a flux it runs the scales off. or other impurities which form in the fire, and to that extent is beneficial. The metal should not be dipped in sand. Use a little on top of the scarf. When iron does not weld at proper heat the fire needs cleaning or the fiber grain is so short that it drips off like cast iron. The smallest piece of brass will prevent welding. Borax, sand and drillings mixed is a good flux. 8. There is no iron-clad rule for setting tires. Heavy tires should be set nearly red hot, and handled skillfully in cooling, so as not to char the wood. Do not bruise wheel with hammer, use the flatter on rim in setting tires. See that they are cool before being laid aside.

W. H. GUNN, Virginia.

Some Wagons and the Craft in General.—The accompanying engravings show several of our wagons built for hauling fertilizers, coal and everything hauled on a body wagon. I am beginning to build spring hay wagons. I think if some of our brothers would get started on building these wagons and get one or two of them in use they would have more work on their hands than they could do, for every farmer and

THE BUILDER IS A PENNSYLVANIA SMITH AND MUCH INTERESTED IN THE CRAFT

A NEAT APPEARING, WELL BUILT WAGON IS AN EXCELLENT ADVERTISEMENT

teamster would have one; at least this is the only wagon that seems to take in this valley.

I like very much to read the different ideas in our paper. I noticed in one issue some time ago that a brother mentioned that we ought to have better prices. He said: "You go into a town and you will notice the blacksmiths are not living in the nicest places." I know this to be the case very often, but think one of the main causes of this is that many men, when they earn a dime, spend half of it for rum. Cut out the rum and put away the nickel for a few years and you will be living as well as your neighbors. I know blacksmith's wages are as good as those of any other mechanic, and if I could not make wages or a little more out of my shop I would sell my stock and work by the day.

I have worked at the trade of wagon-building and horseshoeing for seventeen years, the last seven in my own shop. I have power in the shop which saves a lot of hard work. I also have a House cold-tire setter and know them to be all right. I often make a dollar or two before breakfast or after supper. Get one, boys, and keep up with the times, instead of being like my father who, when I talked of getting a Champion blower, said: "You can't get anything better than the old bellows." When I talked cold-tire setter it was the same old story. I know there are a lot of these old-fashioned fellows, but the only way I see to make anything out of your work is to keep up with the times. What would we think of a veterinary or a physician who was not up to the times?

R. E. Eckrote, Pennsylvania.

A Talk on the Cold-Tire Setter Question.—I have been a reader of your paper for years, but have never written you on any subject. I have, however, just finished an article by Brother Frank Hawkins, of Kansas. Now, as I am a native of the Sun Flower State, I am going to take up his talk on cold-tire setting. I would judge from the article that our Kansas friend had never used a cold-tire setter at all or had used a very poor one. I have worked at the trade fifteen years and for the last four years I have used the cold-tire setter. I think the trouble with most smiths is that they don't want to invest money enough to get a good machine. I have tried several and find that the best is the cheapest. I have a No. 4 Brooks machine, manufactured at Wichita, Kansas, and have set as many as one hundred tires in one day with but one helper. I also can do a better job than by the hot process. If Mr. Hawkins doesn't believe it, let him come down to my place, and each of us take a tire in the same condition, he setting his hot, and I setting mine cold. If, after the trial, he does not agree that the cold process is the better, I will pay his expenses without saying a word.

Now as to the manufacturing companies all claiming their own machines to be the best, this is a fact, and I had lots of trouble over it. Finally, however, I got the highest priced machine and got a good one. I think the companies could do more good by sending a man with the machine to set it up and teach the blacksmith how to operate it. They sent me one or two men at different times, but they did not know anything about the machines; did not, in most cases, have even a mechanical knowledge of the machine, much less any practical experience. Their main and only business seemed to be to sell machines. I think that the brother will find that he can get a good machine, backed up to do good work or no pay, if he will only look a little higher. The first cost is nothing to a man who has business.

Louis E. Calame, Oklahoma.

MR. A. W. PHIPPS SAYS THAT BUSINESS HAS BEEN VERY GOOD

WYOMING PRICES ARE GOOD COMPARED WITH SOME SECTIONS

A General Shop of Wyoming.—The accompanying engravings show both an interior and an exterior view of my shop. We have done a splendid business this season. Prices are good in Wyoming; shoeing, $2.00 per horse; tire setting, $1.00; steeling plow shares, $1.25, and other work equally good. I find The American Blacksmith a great help to the old hands as well as the beginners.

A. W. Phipps, Wyoming.

Junk Piles and Examinations.—As to the "junk piles," of which I read in the November number, I think that Mr. F. H. Lewis is right. I keep my junk sorted as I get it and take it out of the way every few days, so that I do not have to walk over it every day.

As to an association of blacksmiths, I wish we had one here. It would do us all good, as I think we have too many variations in price among the smiths of this place. Some of them charge different prices to different customers, and it seems to me that each man should pay the same amount for the same piece of work. There are smiths here, who, if they could do the work by talking, would be experts at the trade. A man will take his horse to a "quack" (perhaps I am one, myself), and have it shod by him until the animal can hardly walk. Then he takes it to another smith and tells him that the horse has been poorly shod and he would like to have it dressed correctly. He will continue to come to the good smith until the horse is again in good shape, when he will return to the "quack." And the latter will again soon have the poor horse in such condition as to leave no sole on the foot for the shoe to rest on, which job the quack will maintain "is the best in the State, and he will defy any man to beat it." Any man with sense would know that to shoe a horse in this manner will result in more harm than good, yet I have taken off shoes that have been put on by such so-called smiths, and have replaced them by shoes two sizes larger. It seems to me that if you put a No. 4 shoe on a foot that requires a No. 6, and cut the foot to fit the shoe, you are doing the horse a great wrong. I always make the shoe to fit the foot, not the foot to fit the shoe. I have known the same smith to remove a wagon tire and set it without cutting it or staving it, and then defied any smith to beat it! Do you think the wheel was improved any by his work?

A doctor must study and pass an examination before he can go out and earn a living by practicing his trade—why should a man be allowed to shoe horses when he does not know as much about shoeing as the horse himself. If the horse could but voice his knowledge? I think that the craft should pass a law making it necessary for a smith to pass an examination before allowing him to follow his trade. This would make it much better for the rest of us. If I could not pass such an examination I would gladly step down and out, and give the smiths who knew their business a better show.

I should like to hear from some other smiths regarding this idea through our paper, as I have only been in the smithing trade for about three years. I do not, however, say I cannot do a thing before I try it; if you do not get it the first time try until you do.

Wm. Campsey. Pennsylvania.

VOLUME 10 NUMBER 5

THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO N.Y. U.S.A. FEBRUARY, 1911 $1.00 A YEA 10c A COP

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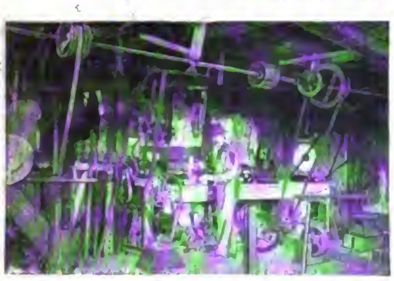
J. N. COOK, Richland, Iowa.



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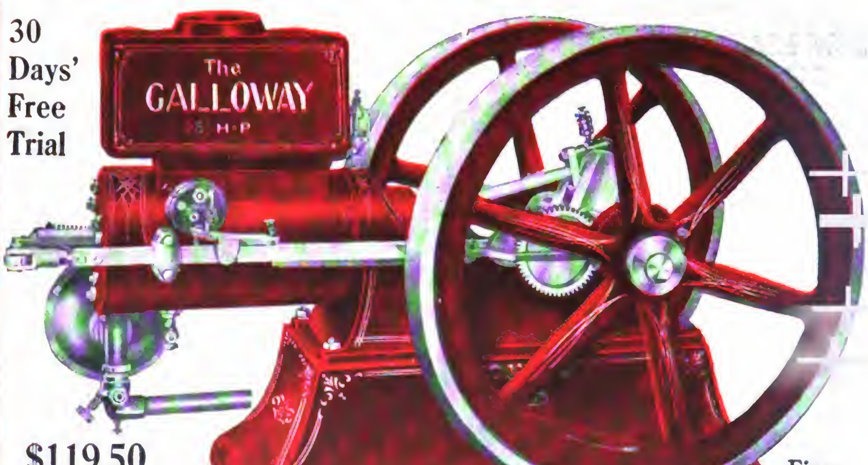

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The American Blacksmith is published monthly at The New Sidway Building, Buffalo, N. Y., U. S. A., by The American Blacksmith Company. Incorporated under New York State Laws. Entered, February 12, 1902, as second-class mail matter at Buffalo, N. Y. Act of Congress, March 3, 1879.

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Albert W. Bayard, - - Secretary.
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A Good Judge.

When a smith has one blower in his shop and has never tried or used any other he cannot be as good a judge of blowers as a smith who has tried and used five or six makes. The smith-of-one-blower may be well satisfied with his machine, and there is no reason why it cannot be a good make. But, as a judge of blowers, that smith has had no experience. And so it goes with readers of trade journals. The man who reads but one journal or magazine cannot say how it compares with others. When you want a comparison you ask the man who reads five or six magazines. He can tell you how they compare and why a certain one is better than all the others. And it is for this very reason that we consider Mr. J. E. Lyon, of Texas, such a good judge. He says: "I think The American Blacksmith the best paper I have and I take five or six other magazines. I read them all, but I think your paper has done more for the craft than any other paper."

We did not ask Mr. Lyon for an opinion or a comparison of the papers he reads. And right here we may say that the expressions and testimonials which we quote from time to time are unsolicited. "Our Folks" write and send them in to us free-willed and unasked.

This Issue.

This issue is of especial interest to every one of "Our Folks," by reason of its being a gas engine number. It is not necessary for us to discuss the importance of the gas engine—we believe all of you realize its importance. To those who do not know or who do not believe in the importance of the gas engine we would suggest a reading and re-reading of Mr. Cormack's article: "The Blacksmith and the Gas Engine." To every one of "Our Folks" Mr. Cormack's article is a lesson in buying, selling and business practice.

You will find the other articles on gas engine topics very practical and helpful, and whether or not you are now a gas engine user you will be interested in every line.

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Through Jobbers.

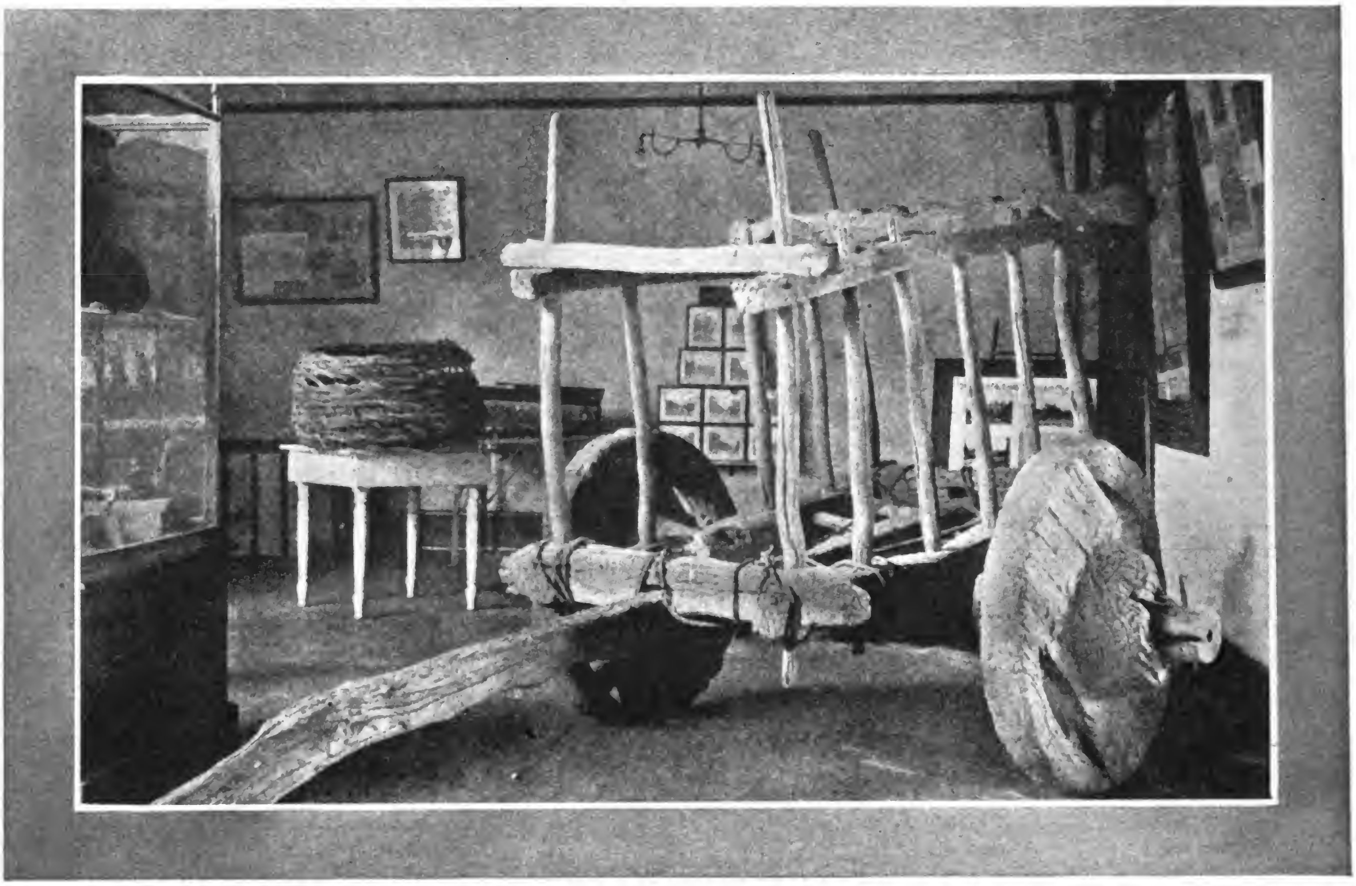
You can now subscribe or renew your subscription to "Our Journal" as easily as ordering a bill of goods from your jobber's salesman. In fact, you can now purchase American Blacksmith subscriptions from the same man who takes your order for other smith shop necessities. This arrangement with the jobbers from whom you purchase your supplies simplifies the matter of subscribing and renewing your subscription to "Our Journal," and is another link in our chain of Satisfactory Service to Subscribers.

We announce this month the names of the firms with whom, up to the time of going to press, arrangements have been completed for handling American Blacksmith Subscriptions. The names of other jobbers will be added just as soon as arrangements can be completed.

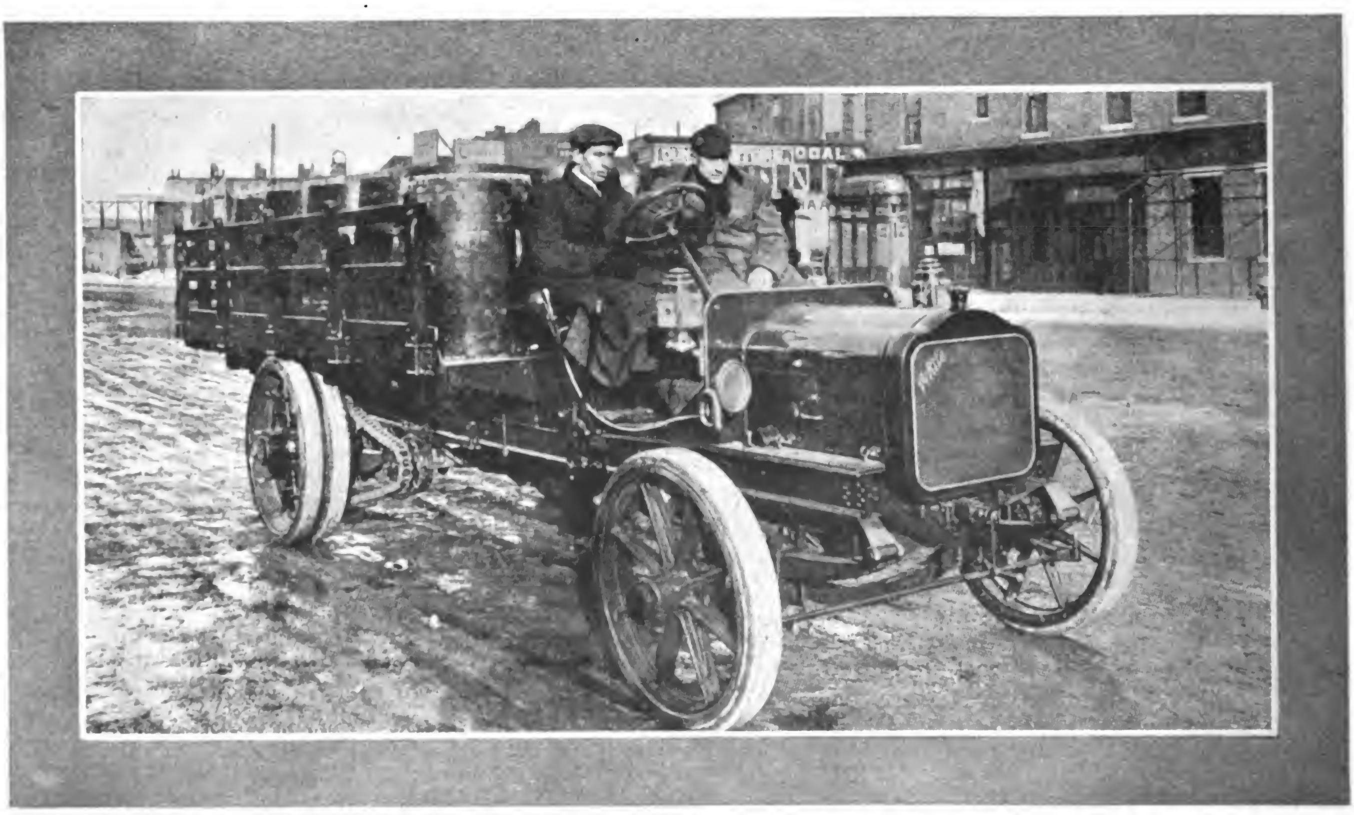
This feature of our service to subscribers is, we believe, without parallel in the publication field. We have made this radical departure for the purpose of serving "Our Folks" better and to enable us to be of still more value and benefit to the craft. There is certainly no reason why American Blacksmith Subscriptions cannot be sold through jobbers the same as any other smith shop necessity, and it certainly simplifies matters if the smith can order his subscription at the time he orders his other shop supplies.

When your jobber's salesman calls on you, ask him to explain how easily you can now subscribe to "Our Journal." Ask him to explain the simple coupon system. Even if you do not need to renew immediately, you'll want to know about this new link in our service.

TWO HORSELESS VEHICLES



THE OLDEST VEHICLE IN AMERICA (See Page 119)



THE LATEST TYPE OF VEHICLE IN AMERICA

The Blacksmith and the Gasolene Engine

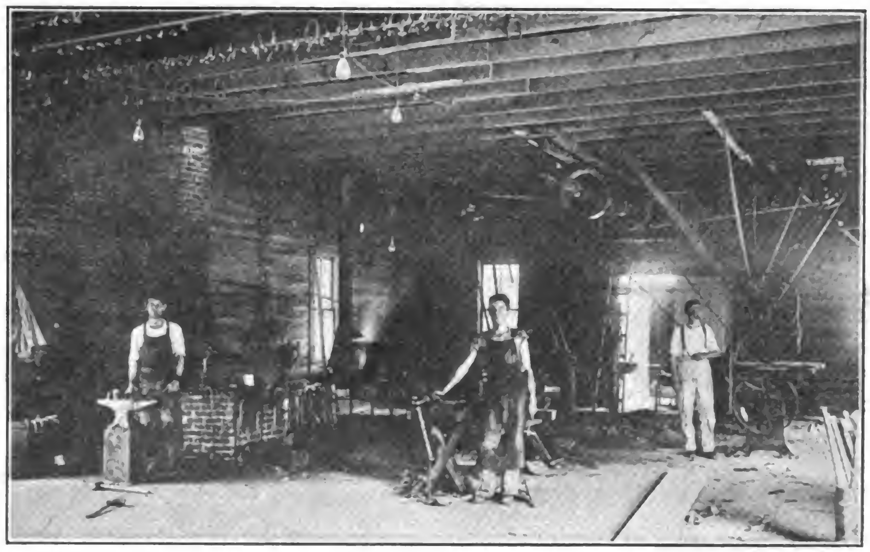
GEORGE CORMACK, JR.*

PRIOR to the advent of the gasolene engine, any form of power or power driven machinery was extremely rare in the ordinary blacksmith's shop. In fact, in the shop where there was only work for the blacksmith himself and an occasional helper power was unknown. In shops where three or four men were employed and where the blacksmith was unusually progressive an occasional small steam engine was found, but such instances were extremely rare. Once in a while a shop would be seen where a horsepower was installed, and in the busy season a little power was obtained by this means to help out. The inconveniences attending the operating of either small steam engines or horsepowers are so great, however, that they are entirely unsuitable for the intermittent power demands of a small blacksmith shop.

The advent of the gasolene engine in the power field has, however, opened up a new era for the blacksmith. The gasolene engine is not only a great convenience but it has become a necessary part of the equipment of the modern blacksmith's shop. It is the only power, barring the electric motor, which is suitable for intermittent work. The electric motor can only be used in localities where electricity can be obtained. This condition entirely debars the country blacksmith from its use as a power producer, while the gasolene engine is available under all conditions and, in consequence, is the ideal power for isolated localities. The gasolene engine is always ready to start, and when the work is done it can be shut down and the expense of operating is immediately stopped.

I believe that some of my readers will be ready to contradict at least part of the above statement. It is often claimed by those who have bought gasolene engines that they will not always start up when wanted. I have often been told that an engine was so much trouble to start that in many cases the work could be done by hand in the time it took to start the engine. In nearly all of such cases, however, it has been my experience to find that the main trouble has been in the fact that the engine has been expected to keep itself in such a shape as to be always ready and willing to start. The problem is really not whether the engine is ready to start, but whether the operator is ready and capable of starting the engine. Has the operator who experiences trouble in starting the engine fitted himself by acquiring sufficient knowledge of gas engines to be able to keep his engine in a condition where it will always start readily?

To those who have bought gasolene engines or who anticipate buying them I would say that if all you intend to do with the engine is starting up and stopping when the work is done, then it is inevitable that the time will come when the engine will not start readily; nay, more, when it will not run at all. In my experience in the gasolene engine industry both as designer and builder I have long since learned to pass up the fairy tales of the average gasolene engine salesman and, in fact, to discourage all such arguments as have been so often used to win a customer. You all know the salesman's yarn that his engine is always ready to start up, that it will inevitably start on the first turn of the wheels, that it needs practically no attention, and that anyone can run it without experiencing any trouble whatever, even if he has had no previous experience with gasolene engines. Such statements are not true, even though it is a fact that a good gasolene engine requires less attention than any other form of power producing machine. The attention, however, which it does require in order to operate it successfully must be intelligent attention. It must have as its basis a correct knowledge of the principles of gasolene engines.



A CORNER OF MR. LETBETTER'S ARKANSAS SHOP WHERE ALL KINDS OF REPAIRING IS DONE

Let an inexperienced man take your forge, he can probably heat a piece of iron in the fire and do some forging on it, he may be able to hammer it into some simple forging, but after he has used the fire for half an hour he could no more make a weld than he could fly. The fire would then be in a condition where it would be impossible to get a clean welding heat, and he would not know how, nor realize the importance of putting it in a condition where a

*Mr. Cormack is Superintendent of the Gas Engine Department of the Independent Harvester Company.

SOME OF THE POWER MACHINES IN MR. F. J. OBERST'S NEBRASKA SHOP

clean heat could be obtained. In order to do welding in a common forge fire there has to be a definite and practical knowledge of how to keep the fire in proper shape. It is not a matter of putting on coals and turning on the wind. The knowledge necessary for the making of a good clean weld can only be obtained by close observation and prolonged experience. The operating of a gasolene engine is, however, a much simpler science, if I may so put it, than that of making a weld, for the making of a weld and the keeping of a forge fire in the proper condition to insure a clean and even heat of the pieces to be welded is a science of no mean order. It is an art which can only he learned after many trials and many failures. You cannot, by writing, tell a man how to make a good weld. He has to learn it for himself, you cannot, even by showing him, make an expert out of him. Instruction and demonstration may help him to more quickly acquire the art, but they never can teach him the things which make him an expert.

Much, however, can be learned about the operating of gasolene engines from reading or from practical demonstrations and oral instructions. In fact, any man who will devote a small portion of his spare time to reading up on the gasolene engine can soon become a successful operator, and able to overcome the ordinary troubles which arise. The man who has a gasolene engine and who is interested enough in it to study it up a little will soon find that when he understands the principles on which it acts it becomes to him a machine of extreme simplicity. If the time which some men spend in useless attempts to start up a gasolene engine which, due to their lack of real interest and lack of knowledge has gotten slightly out of adjustment, was spent in an honest attempt to acquire some real knowledge of the engine their troubles would soon vanish, and we would hear but little talk of the unreliability of the gasolene engine and troubles in starting up.

To those of my friends the blacksmiths who are thinking about buying a gasoline engine I have only one piece of advice, and that is:—Buy a good one. Do not do as so many do, after looking at ten or a dozen different engines, and buy the one which costs the least money. There is an average and a fair price at which all good engines can be bought. In good, reliable engines made by reputable and well established builders this price will not vary much, and if an engine of the same horsepower is offered you at a price which seems low in comparison with the price of standard makes it is well to make yourself sure by the most rigid inspection that the engine is properly constructed before closing a deal. In selecting an engine the main points to look at are as follows:—A fair weight of material in the engine—a light weight engine will usually be short of life. An engine which operates and delivers its rated horsepower at a moderate speed—any engine which has to run at an excessively high speed, unless exceptionally heavy and well constructed, will soon wear itself out. A heavy crank shaft provided with wide and heavy bearings. The bearing caps should be fastened down by means of studs provided with nuts and lock nuts. Avoid engines where the caps are fastened on with cap screws. Cap screws in the main bearing caps of a gasolene engine will inevitably work loose and give trouble. Cap screws are handy and preferable for many purposes, but they have but a limited use in correct engine construction; therefore, avoid engines where the cap screw is too much in evidence; studs and nuts are the proper thing. The main bearings in a horizontal engine should be set at an angle facing the open end of the cylinder. On no account should the joint in the main bearings be in a horizontal plane parallel with the bore of the cylinder. Horizontally divided bearings will wear in a direction where the lost motion cannot be properly taken up by removing liners. The hole will always be oval. The brasses on the crank pin and at the piston end of the connecting rod should be heavy and attached with studs and nuts. Cap screws in such places are not only poor construction, but they are extremely dangerous. If the fastenings of the connecting rod brasses should loosen up

A WASHINGTON STATE SHOP WELL EQUIPPED WITH POWER MACHINES

while the engine is running, the chances are, if they are not observed in time, that the engine will be wrecked. The piston should be long, have not fewer than three rings in even the smallest sized engine, and it should be closely and well fitted to the bore of the cylinder. All the small parts should be of good proportions, simple, well fitted and finished. Avoid anything which seems trappy. The means for adjusting the various elements of the engine should be ample, and all places where adjustments have to be made from time to time to take up the natural wear of the engine, should be readily accessible.

Use good common sense in making your selection. The every-day blacksmith with his knowledge of machinery should be able to make a more intelligent choice than the ordinary buyer who has had little experience with machinery. Make your selection without reference to price and then try to buy the engine selected as cheap as you can. The good buyer is not he who buys the cheapest article, but he who buys the article he wants, of the quality he wants, at the lowest price at which it is possible to buy it.

When you have bought your engine read all the instructions about it which you can get hold of and, furthermore, be sure that you follow them. Have the man who sold you the engine explain it fully, ask him every question you can think of, and don't be satisfied until he gives you answers which are intelligible to you. A good plan is to take the instruction book which is sent with the engine and, sitting down beside the engine, read it carefully, clear through. While reading and referring directly to the engine you can easily make sure that you clearly understand just what the parts are to which any part of the instructions refer. In this way you will become familiar with the different parts of the engine and with their proper names and functions. It is too late to turn to the instruction book, for the first time, when you are in trouble; although it is usually necessary to turn to the book to make sure; though you should be familiar enough with the instructions to know just where to turn.

AN IOWA GENERAL SHOP WITH A POWER EQUIPMENT

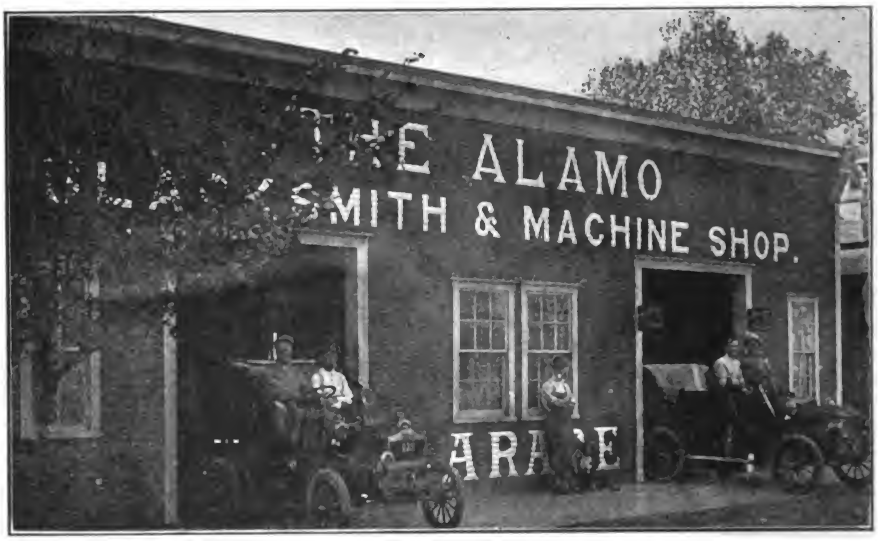
The engine in the blacksmith's shop should by all means be placed on a solid concrete foundation; it will cost a little more, but it is so much more satisfactory and the engine will have every chance to do its best. Take plenty of time to do a good job when installing the engine. It always pays to do such things right. If possible, the engine should be in a room by itself—the smoke and dust of the shop is always injurious to an engine. The engine breathes in air, and if the air it breathes is full of fine dust and grit it is obvious that this will tend to quickly wear the piston and the cylinder and likewise all the moving parts; materially shortening the life of the engine. The engine room should be well lighted and kept clean. Plenty of room should be provided so that the engine can be approached from all sides. The wrenches, oil cans and tools which come with the engine should be kept in the engine room; the wrenches hung up on the walls where they can always be at hand when needed. The wrenches should never be used for general work in the shop. If they are, the chances are that when you want them to do work on the engine you will not be able to find them readily. A battery tester should be included in the equipment of the engine room, the batteries should be tested from time to time and when they get below eight amperes a new set should be ordered so as to be on hand when wanted, thus avoiding a shut down. The battery and coil should be kept dry. A good plan is to set the battery box on a shelf attached to the wall at a convenient height. The wires should be run up the wall to the ceiling of the room, along the ceiling to a point directly over the engine and then dropped down to the engine. Wires put up in this manner are out of the way and do not interfere with your getting to all sides of the engine. Again I say install the engine right, it will not cost you over five dollars more to do it that way than it will the other way. Do not leave things to be fixed better after awhile—do them up right while you are at it. After awhile is just as far off tomorrow as it is today, and too often we die or get broke before it comes around.

THE POWER CORNER OF WALTON AND KUENKEL'S IOWA SHOP

The country blacksmith is really the

man who ought to hold the supreme position as the agent for gasolene engines in the country towns, but in too many cases the profitable field is either entirely neglected or cultivated in a half-hearted manner. The blacksmith comes into contact with nearly every one in the community in which he lives, and his opportunities for selling gasolene engines are many and varied. The mechanical knowledge which he possesses should help him in becoming an expert in fixing and installing engines and machinery driven by them. If he takes up the selling of gasolene engines as a branch of his business he should select his line of engines with great care. Make your selections on *quality* alone. You may not at first be able to sell as many engines as a competitor who handles a cheap engine, but you will get the good trade, and you will always find in any line of business where goods are bought and sold that the man who is handling the high grade stuff is usually piling up the high grade bank account. Your sample engine can be used to run your own shop, and its installation should be the very best. Buy your engine from a reputable and well established builder. Any such concern will be only too glad to send you a capable man who will give you all the points he can, together with the right line of talk to hand out in selling engines, the points to emphasize and the right arguments to bring up to convince the customer that this is the engine he wants. You must study your engine, you must know it—an absolute knowledge of the machine you are trying to sell is the principal element in selling machinery. You must be able to answer intelligently every question which the buyer may ask. Your main argument, however, will always be your own engine, and you should spare no effort to keep this engine in the best condition. Keep it scrupulously clean, bright and shiny. Keep it in such condition that after it has been used for a year it will look as if it had just come from the factory. Keep the bearings up so that there is no pounding or rattling. Be a gasolene engine enthusiast and you are bound to succeed. You cannot succeed in anything without enthusiasm and definite knowledge. If you are really interested and enthusiastic about anything you will naturally want to learn all you can about it, and the acquisition of knowledge on that subject becomes easy and is a pleasure. Above all, in selling engines, avoid the running down of competitors' engines. Throwing mud at your competitors is not salesmanship. The true salesman does not waste his time talking about his competitors' machine—he needs all his wind to talk about his own. Talk your own engine. If you mention your competitor you are only advertising him. What you say about him will not usually be believed anyway, so you might as well save your breath. Any man of common sense knows that when a salesman is knocking his competitor and his goods, the goods his competitor is selling are pushing him pretty hard and must have nearly as much if not equal merit if they are continually in his mind. Talk your own engine, show up its merits, give a good demonstration of its running qualities and how easy it is handled. Have your engine always in a condition that you can show it up without apologies. If anything gets ont of adjustment put it right at once. Any explanation to a customer that the engine is not running just right today because some little thing is wrong, and that you will have it fixed tomorrow is ten points against you and your engine. Have your engine so that it is right, show the customer how nicely and easily it works for you and leave him to form his own opinion. Any explanation of your own neglect, although it may seem reasonable enough to you, will not be understood in the same light by the man who wants to buy an engine. He will reason that any engine which goes wrong in the hands of the man who is selling it is not the kind of engine he wants. In his mind he will lay your neglect and incompetency to the engine, he will consider it an inherent weakness in the machine. Put yourself in his place and think for a moment just what your own decision would be if the position was reversed.

The advent of the gasolene engine is opening up many new fields of profitable enterprise for the progressive blacksmith. We are just in the early dawn of the day of power driven machinery. The gasolene engine has made the utilization of power driven machinery possible in fields which were undreamed of ten or fifteen years ago. On the farm the gasolene engine has become a necessity. The farming community has become prosperous, they have the money and are willing to spend it, as evidenced by the thousands of farmers who are buying high priced automobiles. These things are changing the conditions throughout the country, and the services of men of mechanical knowledge and skill are becoming more and more necessary to the farmer. To no one more than the progressive country blacksmith is this vast field of enterprise more readily accessible. The blacksmith who aspires to a participation in this harvest should exert himself as never before to become more of a mechanic. He should study up the installation of gasolene engines, the putting up of line shafts and the problems of power transmission. He should qualify himself to be able to figure the right size of pulleys to give the proper speeds to power driven machinery, and the right width and kind of belt to use in order to transmit a certain amount of power. All of these are really simple problems and require but a rudimentary knowledge of mathematics for their solution. The repairing of automobiles is also opening up a fertile field which is worthy of a close study. The introduction of the gasolene farm tractor will



THE UP-TO-THE-MINUTE POWER SHOP OF MR. W. K. HUFF OF KANSAS

also increase the field for repair work to the man who qualifies himself to take care of it. Many of these things require no more skill than the average blacksmith possesses, but they do require a more definite theoretical knowledge for their successful accomplishment. Spend a little money on books and trade journals and then spend a little of your leisure time in reading them, it will pay big dividends on the time and money invested. The man today who does not keep himself posted in the developments which are continually going on in every line of activity is more than handicapped—he has not entered the race. It is beyond the scope of such an article as this to go into details of the subjects which I have so briefly treated. They could be much enlarged upon and may be so at some future time, but in conclusion just a word to the blacksmith who is looking for opportunities to enlarge his business. To all such I would say that opportunity is at your door, and the progressive and ambitious blacksmith, if he will give the subject a moment's thought, cannot fail to realize that one of the principal elements of these opportunities lies in a more familiar and definite knowledge of the gasolene engine and the ever increasing complexity of the mechanical age we live in, in which the gasolene engine is, and ever will be, such a prominent factor.

Utilizing the Gasoline Engine in the Blacksmith Shop.

WM. GALLOWAY.

Pres The William Galloway Co.

Every day I receive letters from blacksmiths in various parts of the country asking me what power is most dependable for the average blacksmith shop. I do not hesitate to recommend the gasoline engine. The gasoline engine is playing a most important part in the industrial development of the civilized world. It represents that form of power which is so efficient and economical that it would be impossible to dispense with it without seriously retarding industrial progress.

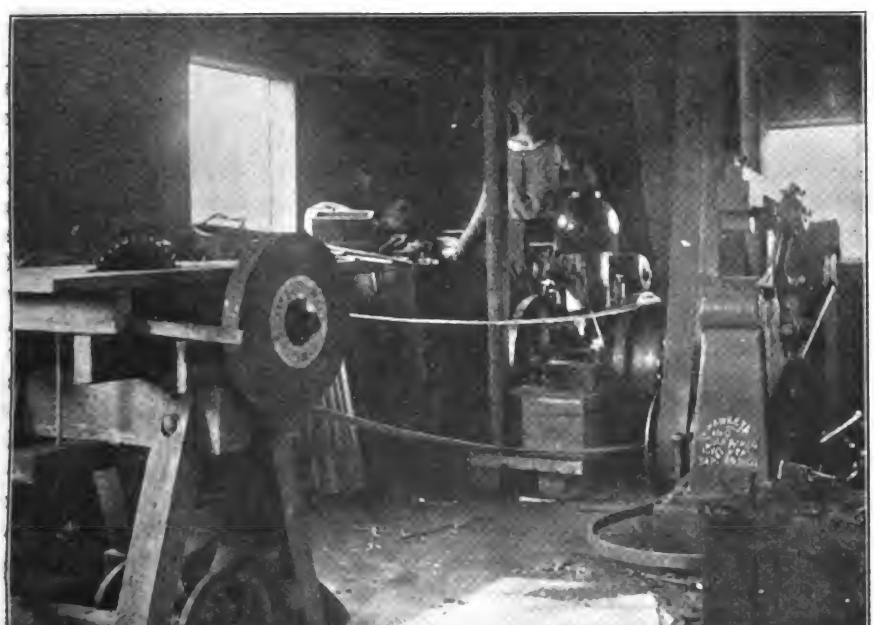
A gasoline engine rightly constructed is easy to operate. You do not have to employ a licensed engineer or a mechanical expert to keep it in running order. All that is necessary is a little attention, a fair amount of common sense, and your troubles will be few. Blacksmith shops require dependable, reliable and also economical power. In any community the work of the blacksmith is vitally important. His work should be done rapidly and skilfully. If he is going to perform well his part in the community, he must have the best power and equipment that money can buy or brains produce.

THE GALLOWAY ENGINE IN THE SHOP OF MR. BERT COSS OF MISSOURI

The blacksmith's inability to perform a certain amount of work in a given length of time, on account of unreliable power may cause a great loss to his customers. It may mean a loss of several hundred dollars to a farmer, a thresherman or a mill owner. I have known of instances where unreliable power in the local blacksmith shop has caused a distressingly large loss to the farmer in harvest time. I have known of other instances where threshing crews were held up a whole week, causing a great loss to the thresher as well as a great loss to the farmer; all of which could be charged to lack of dependable power in the blacksmith shop where necessary repairs were to be made. The blacksmith who reads this article knows what it means to be compelled to delay important work for his best customers, just simply because the power in his shop proved to be a failure when he needed it the most.

I positively and absolutely know that the gasoline engine is a success in the blacksmith shop, because I have sold a large number of gasoline engines to blacksmiths, and the good reports that have been received convince me that every shop, no matter where located, should be equipped with a reliable gasoline engine.

The careful engine builders of today do not neglect the essential points and so far as lies within their power do their utmost to turn out an engine upon which



MR. P. H. RIMMER OF IOWA AT HIS GALLOWAY ENGINE

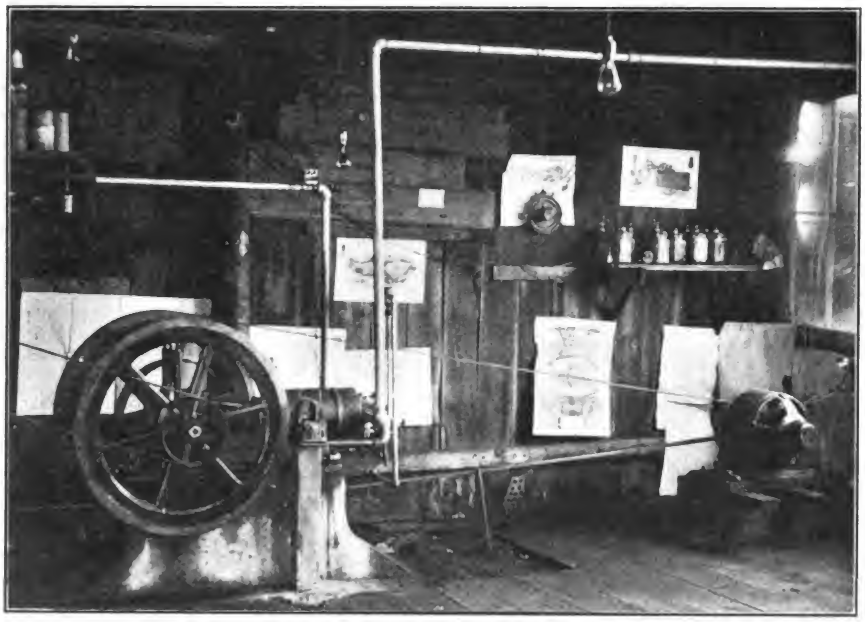
the blacksmith can rely under all sorts of conditions. The blacksmith who installs a gasoline engine in his shop should be very careful in selecting an engine that has proven itself at the kind of work he wants it to do. After he has selected the engine which he knows will meet his requirements he should place it on a good foundation in his shop. The foundation for the engine should be placed where there is good light and enough room to allow one to get around the engine easily. A cement foundation is always best, and it should be made deep enough to reach solid earth, because upon the solidity and stability of the foundation will depend much of the blacksmith's success in using the gasoline engine.

In one corner of the blacksmith shop there should be a small room, well lighted and free from dust. In this room the engine should be placed on a good foundation and all the machines in the shop ought to be driven from line shafting. The shafting used should have torsional strength sufficient to withstand more strain than can be placed upon it by the engine used. Much depends upon strong fixtures for the shafting. If the shafting is to be suspended from the ceiling, nothing is better to have than good adjustable ball and socket hangers. On account of using so many machines in the average blacksmith shop it is advisable to use a friction clutch pulley on the engine, and tight and loose pulleys on the line shaft. Whenever the blacksmith is through using one machine the drive belt can be shifted to the loose pulley on the shaft without stopping any of the other machines.

The blacksmith who wishes to install a gasoline engine in his shop should submit his requirements to a known authority on the subject. The blacksmith who desires information concerning this kind of power for his shop should be careful to give all the information he possibly can concerning the machines he intends to operate. He should state how many feet of shafting he can use and how he desires to fasten the shafting in his shop. Many of the machines which he has in his shop are equipped with drive pulleys, and he should never fail, when writing to gasoline engine manufacturers for information, to give the name of each machine and the diameter of the drive pulley used on it. This information enables the gasoline engine manufacturer to get to work at once and make an estimate of what is needed and just how much everything will cost.

In closing this article I wish to urge the blacksmith, no matter where he lives, whether in the United States or in a foreign country, to get in touch with some manufacturer who has a reputation for honesty and integrity, and whose gasoline engines have proved themselves out at the kind of work that is to be done. Do not hesitate to write any reliable manufacturer for information of this kind, because he is always ready to give it, whether you buy from him or one of his competitors.

No occupation is more honorable or more important in any community than that of the blacksmith, and to every blacksmith to whom this magazine may come this month I extend the most cordial good wishes for a prosperous and successful year.



THE POWER AND LIGHT OUTFIT IN THE SHOP OF BELLAMY BROTHERS

The Gas Engine for Light and Power.

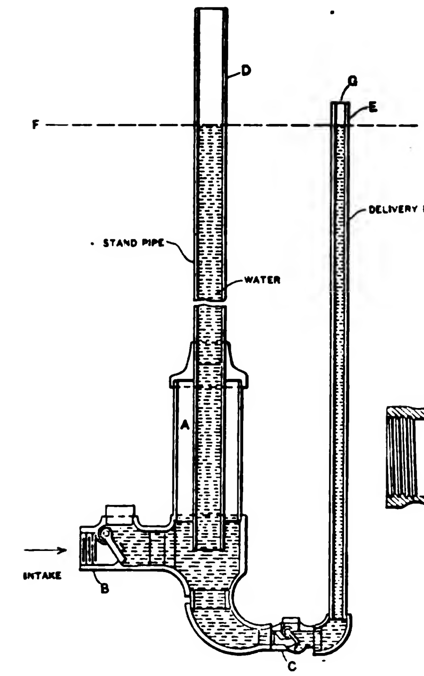
BELLAMY BROS.

The accompanying engraving shows our power equipment with which we operate and light our blacksmith shop and garage. The power we are using is a 6-horsepower Standard Witte Engine (Witte Iron Works Co., Kansas City, Mo.), which we have mounted on a concrete base. The engine shaft is extended so that we can drive our machinery from either side, but as you will note, on one side we operate the power equipment of our shop, consisting of drill press, lathes, emery wheel, buffer, blower, etc., for the blacksmith shop, and a complete line of wood-working tools used in wagon construction. From the other side of the engine we operate our dynamo with which we furnish lights for the shop on dark days and when we work overtime at night; and at certain seasons of the year we furnish light to our next door neighbors.

With this equipment we can run day and night, furnishing our own power and lights at small cost, making it an independent power plant.

We usually operate ten hours per day and use much less than one pint of gasoline per horsepower per hour, on full load—the consumption being less when we are running only part of the machinery. The engine starts easily in all kinds of weather. The company sent us a very complete instruction book and we have never had any trouble in obtaining the best of results. The engine is equipped with a wipe feed oil system, so that it does not require constant oiling. Fill the cups once a day and it feeds automatically. We use a magneto which furnishes the spark, and in this way the engine generates an electric current itself, saving the expense of batteries. Within two minutes after we have opened the shop in the morning our plant is in operation, while with our old steam plant we were compelled to spend more than an hour in getting the power ready. It costs us practically nothing to light our shop, as we have the engine running for power when we need the lights.

We regret that the position of our machinery is such that we could not show all of it in the photo. We will be



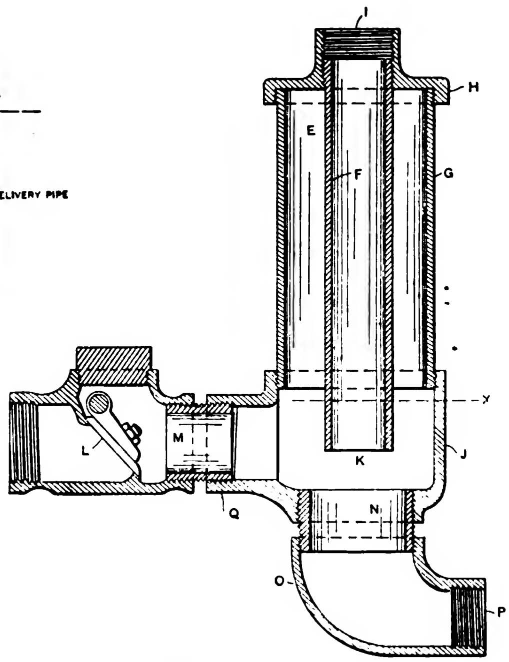


FIG. 1—AT LEFT, SHOWING PUMP, STAND PIPE AND DELIVERY PIPE ASSEMBLED.
FIG. 2—SHOWING SMALL PUMP MADE FROM MALLEABLE IRON FITTINGS

glad to give others the benefit of our experience through the columns of your paper.

Cooling Gas Engines.

GEORGE J. MURDOCK.

In Machinery.

Wherever combustion engines are found, the problem of keeping them cool is an ever-present difficulty, and one which is commonly overcome on lines which are almost as antiquated as the fundamental principles on which the engine works. In cities the cost of water for this purpose is high, and in isolated localities it is seldom that running water can be conveniently obtained, thus necessitating pumping from wells or cisterns at considerable expense of power, to keep the temperature of the engine cylinder within permissible bounds. Where city water is available it can be piped to run by the pressure of the mains through the water jacket, but it is always metered, and costs in some cases as much as $10.00 per horsepower annually. A 10-horsepower gas engine is, therefore, somewhat expensive to run, aside from the cost of fuel.

Investigations conducted by the writer disclosed the fact that out of 500 engines running in the vicinity of New York City, with a total capacity of 17,250 horsepower, for more than 15,000 horsepower city water was used for cooling purposes, at an average annual cost of $7.00 per horsepower, thus involving an expenditure of more than $100,000 each year, which is a total economic waste, in view of our present knowledge of a better method for accomplishing the same result at practically no expense. On this basis it is estimated that in larger cities of this country not less than $3,000,000 worth of water runs into the sewers every year after having accomplished the purpose for which it is used. This huge waste is not the cost of producing power, but one of the consequences of its production. Space is very valuable in cities, and also of some value everywhere an engine can be used, so the large water tank necessary for use with the thermo-syphon cooling system may easily occupy room the rental of which, and value for other purposes, may cost more per year than the running water from the city mains. Such a tank is also costly if made durable in the first instance, and can seldom be placed between the floor and ceiling, but must go up through two stories or else be of excessive diameter.

A cooling system has been developed within the last few years, however, that seems to meet all of the requirements for the efficient cooling of even the largest engines, and which does not entail any cost of maintenance when once installed. It also economizes space, as it does not require any more room than that occupied by the engine. It can generally be put in ready to run for a cost which is less than the water bill for one year when the engine is cooled by city water, and it is considerably cheaper to install than the large tank of equal cooling capacity which is necessary for the natural or thermo-syphon method.

This system has been in operation on a 25-horsepower gas engine for about three years, which is used for supplying power in a novelty factory. In this particular instance the demands on the engine are very fluctuating. Sometimes the engine runs for days at a time on full load and then at other times the load will be comparatively light. The change in the load is partly due to the sudden demands for full power, caused by putting buffing wheels into operation in the nickel-plating department. The new method has given no trouble whatever, and in addition to its adaptability for use with stationary gas engines it also seems to be particularly suitable for service in connection with portable farm engines, such as are used for threshing machines, or in fact for use with any

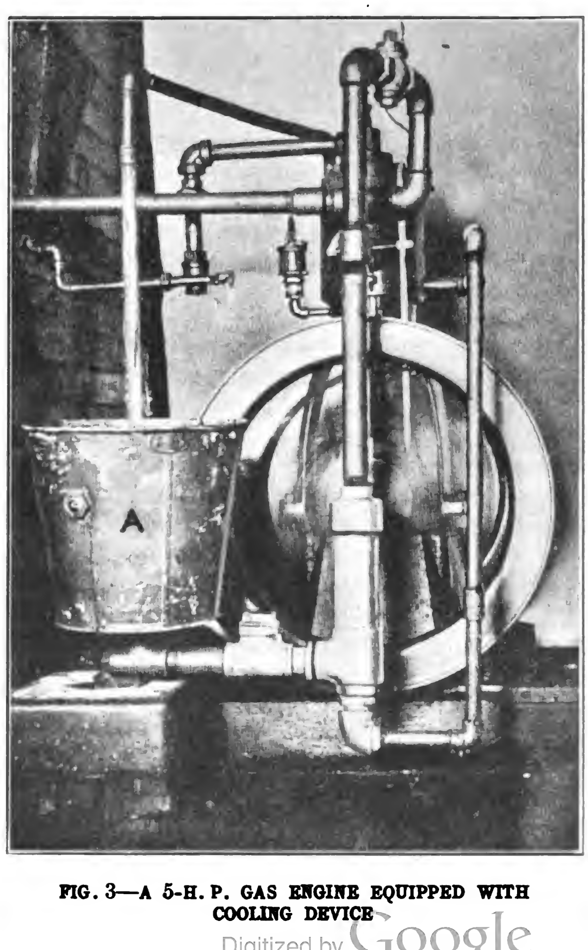


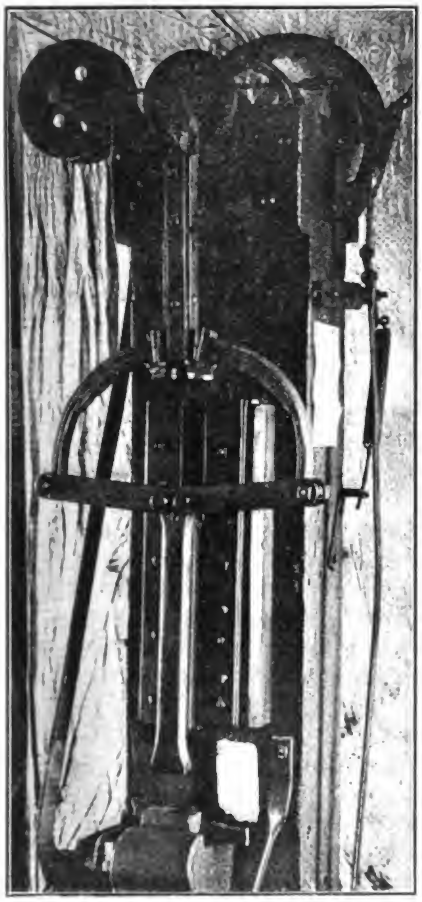
FIG. 3—A 5-H. P. GAS ENGINE EQUIPPED WITH COOLING DEVICE

type of gas or gasolene engine using water to keep it cool. The actual waste of money for water, however, is not the only thing to consider with engines as they are at present cooled. It is a well-known fact that in running on variable loads with a constant stream of water passing through the jacket of the cylinder the engine will consume more gas than it should, owing to being too cold, as the stream of water must be large enough to keep the cylinder sufficiently cool when the engine is working at its full capacity; and when it is running light the same stream makes it too cold to work efficiently, and there is an undue consumption of gas. When the load is thrown on, it takes considerable time for the cylinder to warm up to the point where it can give the greatest power efficiency; consequently it seems that a waste of fuel appears to be unavoidable where running water is used for cooling purposes. With the thermo-syphon system the waste of gas is less, as the temperature of the cooling water and the water jacket surrounding the cylinder is kept more uniform, but besides the objections heretofore named it gets so hot as to generate quantities of steam, which must be conducted outside at considerable expense, and the connections and even the water in the tank are likely to freeze in winter. A simple and efficient pump requiring no attention and consuming no power from the engine shaft is the keystone to the new system. Fig. 1 shows a diagram of the pump, stand pipe through which it derives power from the engine exhaust and a section of the delivery pipe. While the pump works from pressure derived from the exhaust gases of the engine, none of the exhaust goes with or comes into contact with the water to be pumped. It is composed of an air chamber *A*, intake check valve *B*, delivery check valve *C*, the stand pipe *D* and delivery pipe *E*. The lower end of the stand pipe extends into the pump, so as to form the annular air chamber *A*. To illustrate the operation it will be assumed that the apparatus is filled with water until the latter rises up in the stand and delivery pipes to about the line *F*. If sudden gaseous pressure is now applied in the pipe *E*, and instantly released, the water will jet from the top *G* of the delivery pipe *E*. At the same time the valve *B* will be heard to click, and if the hand is wet and quickly applied over the outer opening of the valve a considerable suction will be felt. Immediately after the pressure is applied the water will again rise up in the stand pipe, following the click of the valve, to the same level it was before the beginning of the operations. The reason for this action is as follows:

AN UP-TO-DATE POWER SHOP OF THE KEYSTONE STATE

When the pressure is exerted on the column of air above the water in the stand pipe it causes a downward thrust of the water, which compresses the air in the chamber *A* and also forces the water out of the delivery pipe *E* at *G*. When the air chamber re-acts it throws the water into the stand pipe and upward with nearly as much force as that exerted by the pressure in the first instance, and as the valve *C* will not allow the vacuum thus formed in *A* to be released the valve *B* opens, and inspires sufficient water to restore the equilibrium. This cycle of operations takes place in an exceedingly short space of time, but investigations scientifically conducted have shown that this is the action. It will be seen that to make a practical working pump all that is necessary to do is to connect the valve *B* to a water supply, and the stand pipe *D* to a source of intermittent pressure, such as the exhaust of an engine.

Fig. 2 shows a pump made of malleable iron fittings screwed together. The nipple *F* is screwed into the reducer *H* on the inside, while the lower end of the stand pipe is screwed in at *I*. The chamber thus formed must be perfectly air-tight; therefore, it is best to take a cut out of the reducer in a lathe, and after the nipple *G* is screwed in, run melted solder into the top, having previously wet the surfaces with a soldering fluid. The swing check valve *L* is united to the reducer *J* by a close nipple *M*, and the elbow *O* is joined to the bottom of the pump by the close nipple *N*. For an engine of say 10-horsepower, a one-inch stand pipe and a one-inch intake valve are large enough, while the nipple *G* may be made five inches long by three inches in diameter. It will be seen that anyone knowing how to use a Stilson wrench and who is familiar with pipe fitting can make a pump very quickly and at small expense. A pump of this size has lifted a ¾-inch stream of water 20 feet high with the exhaust pressure of a 10-horsepower gas engine. While this pump has a suction corresponding to the pressure applied to the stand pipe from the exhaust, it is not capable of drawing water from a deep well, and where a well is used or a cistern is available the pump should be lowered down to the water level or considerably below it. Pumps of this class have been found to work even better under these conditions, which necessarily involve the use of a longer stand pipe, than when used above the water. Where the water is to be forced through a long pipe and to a radiator it is advisable to use a check valve on the delivery pipe, but where the pipes are short, only the intake valve *L* is necessary. This is illustrated in Fig. 3, where a 5-horsepower vertical gasolene engine is shown running at 350 revolutions per minute. The water is being lifted about 4½ feet above the tank, and after passing through the water jacket of the engine cylinder it may be seen pouring down into the tank *A* at the left of the illustration at the rate of about three gallons per minute. The tank holds only about six gallons, yet, owing to the exposure of the water to the air in its descent down into the tank, the engine is efficiently cooled. The pump works equally well on governed engines where the



MR. EDWARDSON'S SHOP-MADE POWER HAMMER

exhaust valve is held open for longer or shorter periods or on those using a carburetor and controlled by a throttle. In the latter case, however, some engineering judgment must be used as to the height of the stand pipe, or when the throttle is nearly closed water is liable to be drawn over into the exhaust pipe. It will be noticed in Fig. 3 that the pipe connecting the top of the stand pipe with the exhaust pipe of the engine is carried up higher than the top of the engine cylinder. This is done so that the suction cannot draw water over in the exhaust pipe, as it might otherwise do, owing to the vacuum contained therein, particularly if the exhaust pipe is long.

A Power Shop of South Dakota.

C. J. EDWARDSON.

The engravings show an interior view of my shop and an exterior view of my power hammer. This hammer is of my own make and cost me, all told, about $18.00.

My shop has an up-to-date equipment and I get good prices. I have a 6-horse-power Fairbanks-Morse engine which runs an emery grinder, a rip saw, a 26-inch Silver band saw, a boring machine, a Champion drill press and a power blower for two fires. The engine also runs the hammer, which I consider very good. My line shaft is 30 feet long. I use wood split pulleys and my shop is 36 by 32 feet.

Talks With the Blacksmith on Gasoline Motor Troubles.

J. N. BAGLEY.

Soot in the cylinder may be removed at intervals without any particular amount of trouble if taken in time and not allowed to go for too long. Remove the spark plug and inject a small amount of kerosene and move the piston back and forth to allow the carbon deposit to be cut up by the action of the oil. Gasoline will not answer the purpose, owing to its rapid evaporation. It is a very good practice to clean the engine at regular intervals, the frequency depending, of course, on its use. The cranks should be disconnected, the cylinders removed and the pistons drawn from them. The cylinder may then be wiped out with a cotton rag saturated with kerosene, the piston and rings cleaned, removing the gum deposit that has collected. After completing the operation, the parts should be well oiled before replacing, as this will allow the parts to work smooth from the start.

When a squeak is heard, the engine should be stopped at once and the cause located, as it is evident that the squeak is caused by some part coming in contact with another with insufficient lubrication. For a noise of this kind it is well to look to some of the outside bearings other than the cylinder, as a dry cylinder will not be apt to squeak before it would seize.

Lubrication of the gas engine cylinder is one of the most essential points that deserves attention. As the cylinder of the gas engine operates under a very high heat, the degree of heat at which oil will burn or carbonize must be as high as possible. Many animal and vegetable oils have a flashing point suitable to the use in the gas engine cylinder, and yield a fire test sufficiently high to come above the requirements, but they contain acids that are injurious to the metal surfaces which they are intended to lubricate. Air-cooled motors require a different lubricant than does the water-cooled motor, as their temperature is much greater. One of the essentials of a cylinder oil is that it flows easily to the cylinder and that it will not carbonize under the heat of the cylinder. The maker of the engine should ascertain the kind of cylinder oil which is best adapted to his particular make of engine. Great care should be taken to keep all piping in the lubricating system free from all obstructions.

Many different types of lubricators are used at the present time, the force feed being the most practical, while the splash system is used considerably. It should be remembered that the lubricator will require different adjustments in cold weather than in warm. One of the troubles which confronted the gas engine manufacturer in obtaining satisfactory results from the gas engine was the problem of lubrication. Like the gas engine itself, the process of lubrication was going through the experimental stage. Steam engine oils did not prove a success with the gas engine, as speed and power could not be obtained with them. Even at the present time the question arises: "Can we get a better

MR. C. J. EDWARDSON'S SOUTH DAKOTA POWER SHOP

oil for a little more money?" The engineer who, for a few cents difference per gallon, tries to economize on the oil proposition makes one of the greatest

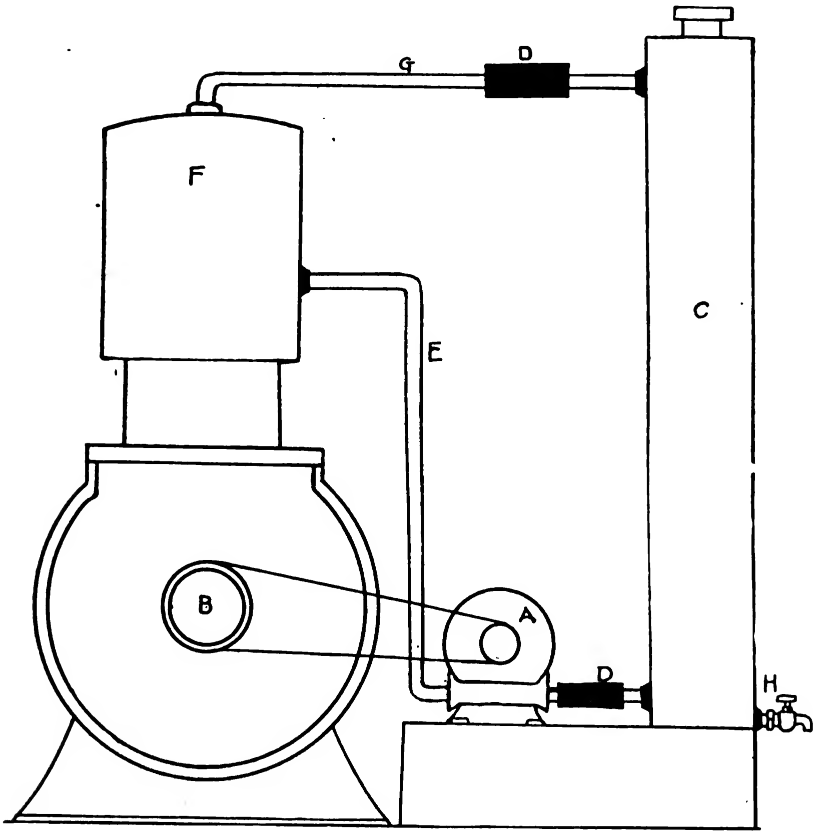


FIG. 1—SHOWING SYSTEM OF FORCE PUMP CIRCULATION

A represents the pump, B pulley on engine by which pump is operated, C radiator or cooling tank, DD pieces of rubber hose, E pipe for cooled water from tank, F engine cylinder, G hot water pipe, H cock for draining radiator

mistakes imaginable. The general qualities essential in a good lubricant for the gas engine cylinder include a "flashing point of not less than 360 degrees Fahr. and a fire test of about 426 degrees, together with a specific gravity of 25.6." At the present time most manufacturers of gas engines furnish full directions for dealing with the problem of lubrication in a practical manner, many of them offering for sale an oil under their own name which they themselves have tried and tested and which they have proven beyond a doubt fulfills all requirements. Oil of this kind is worth many times the price generally demanded, compared to some of the oil offered for sale at a fraction of the price. A good oil will many times remove the carbon deposit made by some poor oil that has been used in the cylinder some time before. At any rate oil will be found much cheaper than machinery and the best is none too good. Generally, if the operator will follow the instructions regarding lubrication, as furnished by the engine manufacturer, his troubles will be reduced to a minimum on that score.

Water cooling for the gas engine seems to be by far the most used. Most engines used for automobiles are of the water-cooled type, the cooling being accomplished by a circulation of water from a tank or radiator to the jacketed walls of the cylinder. According to the laws of liquids the heated water will rise to the top while the cooler layers will fall correspondingly. This is known as the gravity system and will be found in use almost anywhere the gas engine is used.

The pump or forced circulation is much used and has advantages over the gravity system as it keeps the water continually moving from the jacket of the cylinder to the supply tank or the radiator, which being employed, a less quantity of water is required to cool the engine cylinder, or radiate the heat units. Efficiency of the gas engine depends much on the temperature of the water in the cooling system. The best practice is to supply water to the jacket at such a temperature that the hand can be held on the jacket, or in other words, below the boiling point. If steam is seen coming from the relief or outlet of the radiator, look for a stoppage in the pipes somewhere, though if the pumps are run in the wrong direction the result will often be the same. If the pump is to be tested, run the motor for a few minutes and ascertain how long it takes for the water to heat the top of the radiator tubes. It frequently happens that some of the tubes are hot while others are cool, in which case the trouble will usually be found in the pump. The pump is used because it gives a more uniform heat at all times to the engine cylinder and this, of course, adds much to fuel economy. The design of the cylinder should be such that as much of the surface as possible be exposed to the air, the greatest possible amount of freedom for the circulation of the water being the object. There are many types of radiators, but the honeycomb and the tube with small fins are used to a great extent. Motors using the natural water circulation require from 5 to 5½ square feet of radiation to the horsepower. Generally speaking, the thickness of the water jacket space around the cylinder is ⅛ of the bore of the cylinder, while many vary from

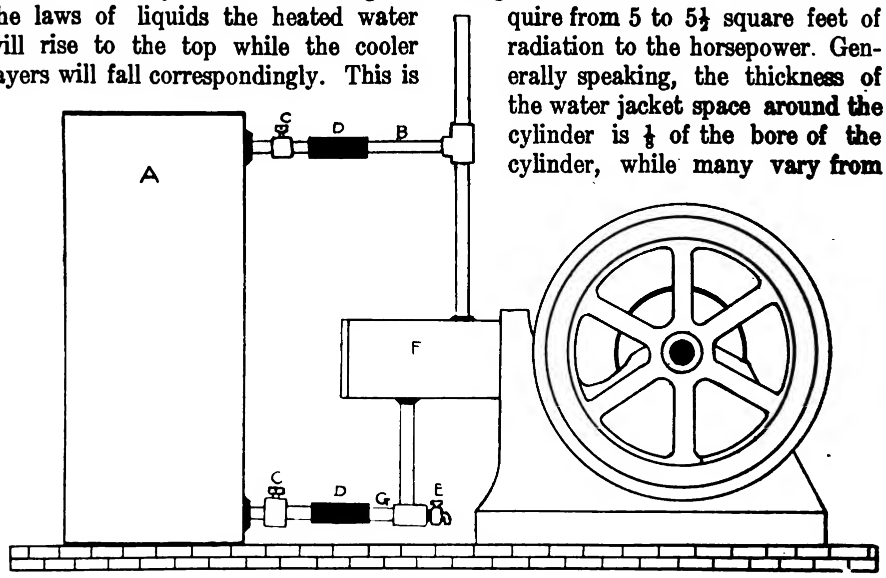


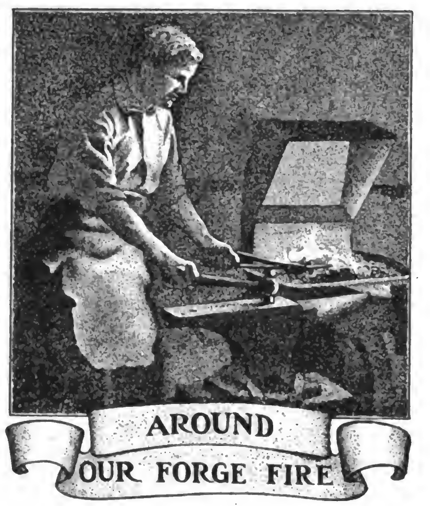
FIG. 2—SHOWING THERMAL-SYPHON SYSTEM OF COOLING

A represents the water tank, B pipe for hot water from engine, C C cut-off valves, D D pieces of rubber hose, E drain cock, F engine cylinder, G pipe for water flowing into engine jacket

this. If water from the hydrant is forced around the cylinder so as to keep cool, the heat from the explosiosn is cooled down so quickly by radiation that the expansive force is materially reduced, and this, of course, reduces the power with the same charge that would give good results with the water at the proper temperature. The object in using water is not to keep the cylinder cold, but simply to cool it sufficiently to prevent the lubricating oil from burning from the heat, for the hotter the cylinder the more power will be developed with the same charge drawn into the cylinder; providing the lubrication of the cylinder is not affected thereby. With the average engine, the consumption of fuel is more economical when under full load and the water temperature correct. All water should be drained from the jacket in cold weather, as a jacket full of water on a frosty night may result in a ruined cylinder and rather expensive neglect for the operator. Anti-freezing solutions are used considerably, which eliminate the danger of freezing to a great extent.

Cylinder head gasket should be examined at frequent intervals, as many times it will prove defective, allowing the compression to escape and hence a loss of power. Water in the cylinder is caused many times by the gasket being blown and the water having free access to the interior of the cylinder. This, of course, makes it impossible to start the engine and also causes the engine to stop many times while running. In repacking the cylinder head, nothing but the best packing should be used, as a poor grade of packing only adds to the motor troubles. Generally the motor manufacturer offers for sale a packing that is best adapted to the packing of the cylinder head, and this should be used in preference to something advertised by firms having the name and not the goods. Experiments with the gas engine are rather expensive and should, therefore, be avoided as much as possible.

Knocking or pounding in the cylinder as it is generally called is caused by various things, but generally by over-rich mixture or advancing the spark too far, causing an ugly knock, and generally speaking, is very injurious to the motor. This sound, unlike any other knock about the motor, can be readily detected. A knock caused by an over-rich mixture is very similar to that caused by too early spark. A very rich mixture is very slow to ignite, and in many cases can be made so rich it will not ignite at all. If retarding the spark from the extreme fails to overcome the knock, it can generally be reduced by closing the throttle sufficiently to give more air and less gas. Advancing the spark to the extreme when the engine is running slow will many times cause a very ugly knock. The spark advance should be gradual as the engine gains in speed. Other causes of pounding in the cylinder, such as premature or self ignition, is a heavy pound and unlike the sound caused from the early spark or the over-rich mixture. The knocks caused by some other effects are in no way as severe as the above mentioned. Among some of the other causes of less importance is a lack of lubrication. This trouble should have immediate attention as soon as discovered as it will cause the cylinder to overheat and seize. A weak spark will cause a knock or, in other words, a sharp puffing sound.



"Say, Mr. Editor, I came in to discuss the question brought up by Mr. Charles Walter in the January number—that article on page 89—'Should the Horseshoer Be Responsible?'"

"That has set your brain to working, has it?" smiled the Editor. "Well, I think I've got something to show you that will come very near putting a kink in your gray matter.

"That article of Mr. Walter's told about the smith paying for a horse that had broken one of its legs while the smith was trying to tie the animal, preparatory to shoeing it. Well, here's another side of the problem, from the *White Plains Record*:—

"'A jury in the Supreme Court has decided that John Gilbert, a Mamaroneck blacksmith, was not entitled to any damages for the injuries he claimed to have sustained when two mules, belonging to John Lynch, kicked him.

"'Gilbert alleged that the mules were unusually vicious, and that, while he was trying to shoe them, they got him down on the shop floor and trampled him.'

"Now, Benton, can you tell us where the shoer gets off?"

"It is somewhat of a puzzle, isn't it?" questioned Benton.

"It certainly is," seconded the Editor, with emphasis. "First, a smith pays for a horse that is injured in his shop because of no apparent fault of the shoer. It is evident that the horse was vicious—it is unreasonable to believe that the smith would take any unnecessary precautions if the horse was not vicious. The quotation from Mr. Walter's paper has it that the shoer tried to put a rope on the animal's foot. The smith in trying to safeguard his own life causes the animal to throw itself and break its leg. And the shoer pays the bill.

"In the second case the shoer is injured and, again—he pays the bill. Looks like a gold-brick game, or 'heads, I win, tails, you lose,' with the shoer playing the part of Mr. E. Z. Mark."

"Isn't there some way of getting a fair deal for the shoer?" questioned Benton. "It seems so very unreasonable and unfair to expect the shoer to pay both ways."

"Well, yes, I suppose if the shoer made his customer sign a paper releasing the shoer from all responsibility regarding his customer's animal, it would hold in court. But, how many customers would sign it or want to be bothered with all that red tape. What the shoer might do is to post a notice in his shop, where everyone may read it, making known the extent of his responsibility. When a customer brings in his vicious horse, the shoer may emphasize his remarks regarding his rule by calling the customer's attention to the posted notice."

"How would you have that notice read?" asked Benton.

"Well, I would say something like this": and the Editor took a pad of writing paper and wrote the following: "I, Jack Smith, will shoe your horse, with the understanding that I will not be held responsible for any injuries whatsoever that your horse may sustain. Neither will you be held responsible for any injuries I may sustain while shoeing your animal. I will use reasonable care in handling your horse, but neither you nor myself will be held responsible in any case."

Signed, JACK SMITH.

"That, roughly, would do to start on, but probably the best thing to do would be to have a simple statement drawn up by a lawyer. Of course, a man can make it as strong as he wants to, but I think the simpler it is the less the owner of the vicious animal will balk at it.

"Then, there is another side to this matter. The shoer protects himself against possible responsibility for the injury of one horse by another. Such a case, I believe, came up some time ago. An animal waiting to be shod was kicked by another animal, and I think the leg of the first animal was broken. That, of course, is something for which the shoer cannot reasonably be held responsible. Yet, I believe, it would be argued that the shoer has the animals under his care and must naturally exercise a certain caution to protect his customers. While, on the other hand, a printed notice hung up in the shop, and the customer's attention called to it, will prevent all disputes and protect the shoer."

"There seems to be quite a number of sides to this problem," said Benton, when the Editor finished. "But I think that a notice posted up in the shop will take care of the shoer's side very well. I would like to know what some of our readers have to say on this same subject."

"Yes, I think this matter important enough to open for a general discussion," put in the Editor. "I believe some of 'Our Folks' can tell something of interest."

Kiddie.

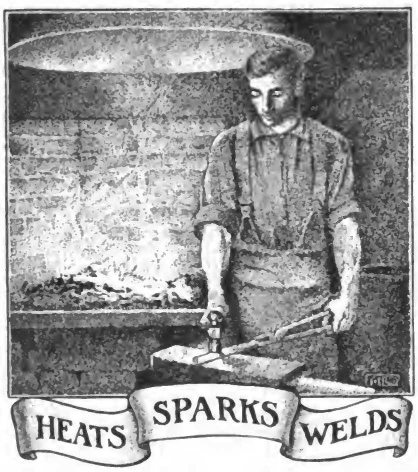
W. O. B.

When I come home from shop at nite, a-
  feelin' kind o' lame—
Perhaps thur's been a rush, or mebbe busi-
  ness hes been tame—
It kind o' makes a chap feel good, an' life
  again seem bright
T' see the kiddie at the gate, when I come
  home at nite.

When I come home from shop at nite, I see
  him from the mill—
He waves his hat an' shouts t'me, an' when
  I climb the hill
He's at the top a-jumpin' 'round, like he
  would never lite—
An' then we race into the house, when I
  come home at nite.

When I come home from shop at nite, sum-
  times it's purty late—
For icy roads make hours long, an' kiddie
  cannot wait—
It's then I miss his shout an' yell, I miss his
  little fight
T' be the first into the house, when I come
  home at nite.

When I come home from shop at nite, I see
  a little tot
A-waitin' on the hill fer me, he looks jes'
  like a dot;
But when I get rite up t' him, it seems he's
  growed a site—
It makes me feel a kind o' old, when I come
  home at nite.



Pare the frog and spoil the foot.

If at first you don't succeed, consult THE AMERICAN BLACKSMITH.

No law compels a man to advertise! How about the law of business success?

There's mighty few things that are as bad as they seem. Cheer up and hustle!

Experiencing and conquering unexpected conditions is our best school of knowledge.

When a man tries to tell you how to run your business, tell him how to mind his.

Any smith getting a living he doesn't earn? There are some earning a living they don't get.

Keep the dead beat in mind and not on your books. You'll save yourself money and worry.

If you haven't enough business, advertise. If you have more business than you want, advertise for help.

A real, live smith is always willing to tell how he did it. And real, live smiths are always anxious to learn.

Seems as though a customer would prefer the shop where his animals would get proper treatment and not abuse.

Ever think that most failures are caused by unpreparedness? Let's not court failure—don't get caught napping.

Deliver quality and satisfaction with every job you turn out. They speak louder than the ring of your anvil.

Remember, you are one of the others to those that are others to you—and, especially, when you are thinking of cutting prices.

> **Uncle Billy Martin says:** "Ef simpathy cost sumthin', ye kin bet yer best boots thet thur wouldn't be so much of et floatin' 'round."

Friends—you cannot have too many. Kind deeds make good friends. Even a stranger will thaw out under the sunshine of a kind act.

Have you asked for those Easy Plans? You can't form an association of blacksmiths without some effort. Begin right by asking for the Secretary's plans today.

Placed that box of sand in the engine room yet? Not too late, unless you've had a fire—and then you'd better put the sand box in to prevent another fire.

Don't knock your competitor. If he does poor work, people will soon find it out; and if his work is better than yours, they'll find it out, no matter what you say.

The back numbers prevent you from becoming a back number. Do you file your copies? There's no better craft reading than the pages of a good craft paper.

Are you feeding the profits of one department to keep another from starving? Perhaps you don't know—perhaps you do—a good system of accounting will tell you.

What's your opinion of the cold tire setter? Are you reading the letters from your brother smiths on this subject? Tell them your experience. We want to hear both sides.

What do you think of the new pink buffalo stamps? Everyone says the new design is much better. If you haven't seen them, ask for a new lot. Of course, you know they are free.

Did you get a calendar for 1911? We addressed one to every one of "Our Folks" whose subscriptions were paid up. If you didn't get yours, ask for it. You are entitled to one.

It's often possible to talk up a sale while blowing your fire, if you handle a good side line. And sometimes it means an honest profit that would otherwise mean considerable hard work.

It's not so much the amount of work you turn out as the quality of the work. Better to shoe one horse well or to repair one wheel well than to do ten or fifty times the work in a careless manner.

It's not necessary, nor is it right, to suspect everybody, but, remember—all the bunco men are not at the county fair, and all of them don't sell gold bricks. Some are fake subscription solicitors.

Working like a slave is unnecessary these days. Modern tools and machines are taking much of the drudgery out of smithing. Don't try to carry on a modern business with grandfather's equipment.

Do you put down every transaction in black and white? Keep records of all your doings in business. Written records are not only valuable for comparisons, but they're indisputable in court.

"Clothes make the man" some say, but it's not well to let yourself be guided accordingly. The high-stepper may belong to a "dead beat," and the owner of the big touring car may be "poor pay."

Of course, you haven't time to visit with your neighbor during rush hours, but don't hesitate to call on him when the rush is over. And take a copy of "Our Journal" along with you. You'll find it an excellent introduction.

Tom Tardy's poor fingers did ache,
As a weld he tried hard to mache.
  At his hair he then tore,
  And he cussed and he swore—
"Blankety-blank," and then, "Goodness-
    sache."

Every honest-minded business man knows that poor, cheap work is profitless. Yet some go on year after year, disregarding past experiences, and then they wonder why they don't succeed—and some of these business men are smiths, too.

It's not too late, even now, to whitewash the interior of the shop. You will be surprised with the brightness and cheeriness of the place. And—Benton says—to mix some Portland cement with the whitewash; "Won't flake off then," says the receipt man.

If you had never lost a customer once gained wouldn't your business now be on "Easy Street?" Study to hold them as long as you stay in business. Look them up when they stray—get at the bottom of their dissatisfaction, and then square it up, if possible.

Ever think what a lot of good you could do with a dollar? For just one greenback you can have THE AMERICAN BLACKSMITH sent to any one you name, get six months' credit on your own account and bring the brightest kind of a smile to our face. Why not do it now?

The shop lad has a hard time of it at best. Don't add to his worry by being unreasonable. The future of the craft depends on the shop lads of the present, and some unthinking request or act on the part of employer may change the youngster's plans for life. Be considerate of the youngsters.

Did you ever run across a smith of thirty, forty or fifty years' experience who thought he knew it all? It's the new beginner who generally thinks he knows all there is to smithing. The experienced smith knows that, while each day adds to his knowledge, it also shows him how much he has still to learn.

Do you keep account of how business is going year after year? Are you doing better or going backward? An accounting at the first of each year will tell you how you stand financially. If you haven't yet done so, take an inventory of the shop and equipment now, and then do the same every year. You can't get even an idea of your true worth by any other means.

The following story is told by Mr. H. G. Smith, one of our Ohio readers: "A Mr. and Mrs. X. recently moved to our town. Mrs. X. one day called upon Mrs. Smith, and during the conversation the new neighbor told my wife that her husband was a section foreman. When my wife, upon being questioned, said, 'My husband is a blacksmith and runs the shop here.' Mrs. X. said, 'Oh, well! that is better than doing nothing.'"

An Old Cart.

W. O. B.

One of the engravings in the frontispiece of this number shows what is said to be the oldest vehicle in America. It is an ancient carreta, or ox-cart, such as the writer mentioned in his article on "The First Vehicles in America," in the August issue of 1910.

The cart shown in the engraving has wheels of sycamore, 38 inches in diameter and about 6 inches thick at the rim. The hubs are of one piece with the body of the wheels, and roughly extend to about 18 inches. There is no iron used in the cart. The wheels are held on the wooden axle by means of wooden pegs, and the entire vehicle is held together by wooden pegs. The ropes shown were evidently added by the person owning the vehicle during its declining years. But, originally, these carts were made entirely of wood. The body of the cart is of cottonwood, while the tongue, some four feet long, is a piece of mesquite. This cart is said to be over 200 years old.

Designing Ornamental Iron Work.

JAMES CRAN.

The article under the above heading, which appeared in the November issue of THE AMERICAN BLACKSMITH, appealed to me more than anything else published in that number.

My special interest in decorative metal work comes from having "dabbled" in my spare time designing decorative pieces and working out the conceptions in wrought iron and steel. No doubt, the readers of THE AMERICAN BLACKSMITH are familiar with some of those pieces, a few of them having been illustrated and commented upon in the January issue of 1910.

To say the least, such articles as the one already referred to are steps in the right direction, and must be a source of gratification to all readers of THE AMERICAN BLACKSMITH who are possessed of artistic temperament to know that there are so many of their fellowcraftsmen not only in America but in other English-speaking countries who are taking up the art of ornamentation in wrought iron and steel that has for so long been left almost entirely to the smiths of Continental Europe.

The numerous types of ornamentation shown in Mr. Googerty's article will no doubt act as an incentive for finer work and more artistic expression amongst blacksmiths, whose work as a rule is too useful, plain and commonplace to be defined as art in the sense of the term generally understood.

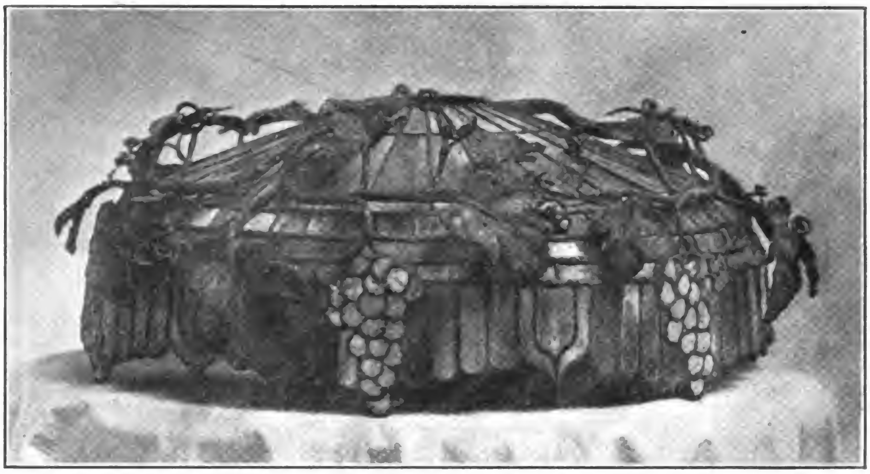
Where blacksmiths are most heavily handicapped in ornamentation is in designing. Comparatively few of them having any special training in that particular line. This not only makes it difficult for them to transfer their conceptions of beautiful things to paper, or express themselves in a manner that is likely to portray their ideas to the best advantage, but, when they come to execute work designed by others, there are generally conditions to be contended with and difficulties to be overcome that cannot be foreseen or fully appreciated except by men of practical experience at the forge. Therefore, it would be wise, when blacksmiths have to do ornamental work other than their own design, to allow them more or less of a free hand, so that details could be worked out according to circumstances.

Although Mr. Googerty has given a great deal of valuable information in the article in question he has passed over a number of points of vital importance to the ornamental iron worker, and I believe a number of things he has said will stand discussion.

Before proceeding further I wish to make it clear that I am not writing for the sake of argument nor am I posing as an authority upon the subject. I simply wish to give my views, which differ somewhat from Mr. Googerty's, and leave the readers of THE AMERICAN BLACKSMITH to draw their own conclusions.

Quoting from Mr. Googerty's article, he says: "It is a question how far realism should be carried in any design. However, wrought iron design should not follow nature too closely, but, on the contrary, must be conventionalized. It is not good form to try to represent natural vines and flowers in design of any kind; they should be reduced to a form that is suitable for the material, representing only the characteristics of the flower and its growth."

My idea of conventionalizing flowers and vines for ornamentation is that they should be carried no further than is absolutely necessary in adapting work of this class for its intended purpose. To begin with, it might be well to say that all flowers and vines cannot be satisfactorily reproduced in iron, on account of color having to be left out. Therefore, only those having characteristics so distinct that they can easily be distinguished without color should be used as models. The following are fair examples of the most suitable types: The rose, the lily, the tulip, the poppy, the thistle and the grapevine. In reproducing any of the above in wrought iron there are several things to be borne in mind if the work is to be carried out successfully. The first is, that it is impossible to duplicate natural flowers and vines in all their details without having the reproduction when completed too stiff for artistic effect. Second, that only the principal characteristics and most suggestive points of the model should be studied, and these worked out in a manner that will obviate the lack of minor details. Take a full-blown rose, for example. In reproducing that flower in iron, only petals need be copied;



A LEADED GLASS LIGHT DOME ORNAMENTED WITH HAND-FORGED GRAPEVINE

thorns and calyxes, being neither characteristic nor suggestive of a rose, are left out entirely. The petals, usually fewer in number in the reproduction than in the model, must be so arranged as to give the reproduction when finished as much of the natural grace of the real flower as possible, and at the same time obviate the absence of minor details. A twist or a dent here and there on the petals gives the effect of shading.

In reproducing rosebuds, either closed or partly open, calyxes as well as petals should be used, as they are characteristic of a rose before it is fully blown. Reproductions of leaves should be modeled after dried up or weathered natural leaves whenever that is possible, as that imparts to the reproduction more natural grace than can be had by using fresh leaves as models.

I need hardly say that I am decidedly opposed to the idea of conventionalizing metal reproductions of flowers and leaves. Nothing is gained from an artistic point of view by reducing a rose to a rosette, or a lily to a bunch of angles and twists that ought to have their names attached to them before they could be at all associated with natural flowers. My experience is that conventionalism, in this respect, is advocated only by those who are unable to suggest nature in their work.

A PHOTOGRAPH FRAME IN ORNAMENTAL HAND-FORGED WORK

The general outlines of any ornamental design, however, should be conventional, but not to the extent of affecting the details. What I mean will probably be better explained by referring to the engraving at Fig. 2, which is a photograph frame made entirely of wrought iron. The frame itself is conventional in shape and is bumped up from sheet. The front was hammered to represent burnt leather, but the decorative parts, including the spray of roses, the butterfly, the bug and the ribbon were all hammered from bar stock, piece by piece, and welded together. They are made to represent nature as closely as it is possible to do so in wrought iron. A fair idea of the size of the piece may be had from the oval opening in the center, which is $3\frac{1}{4}$ by 5 inches. In work of this kind harmony and proportion must be studied, as they play a very important part in the artistic effect of the whole combined piece.

Another example is shown in the engraving, Fig. 1, which is a leaded glass lighting dome. The dome itself is conventional; even the six bunches of grapes, made from small pieces of stained glass leaded together, are arranged equal distances apart around the apron. The vines, however, of which there are three of wrought iron, are made to represent nature, and are conventional only to the extent of the same general outlines being followed in each.

Referring to repoussé work, or the art of bumping out designs in relief on sheet metal, the methods described by Mr. Googerty are generally followed. I have found, however, that the rougher part of the work, which consists of driving the metal through from the back and raising it upon the face where the designs are to be worked in can be done just as well and much quicker by using rings or links of round wrought iron made to suit conditions, in preference to the end grain of a block of wood. The details can also be worked in much better by hammering and punching when the hollow back has been poured full of melted babbit metal which is allowed to set. This is much stiffer, stands up better to the work than pure lead and its hardness can be regulated to suit requirements by the addition of antimony or lead, antimony being the hardening element in the babbit metal.

EDITOR'S NOTE:—As soon as time and conditions permit, Mr. Cran will write a series of articles for THE AMERICAN BLACKSMITH describing the methods he follows in turning out flowers and leaves of wrought iron.

Look Out for This Fake.

W. R. HUNTER.

Georgia.

I wish you would please notify the trade, through "Our Good Journal", of a faker selling a nickel and silver plating solution. I have worked all over the Union and have been up against a lot of tricks but he got me as easy as falling off a log.

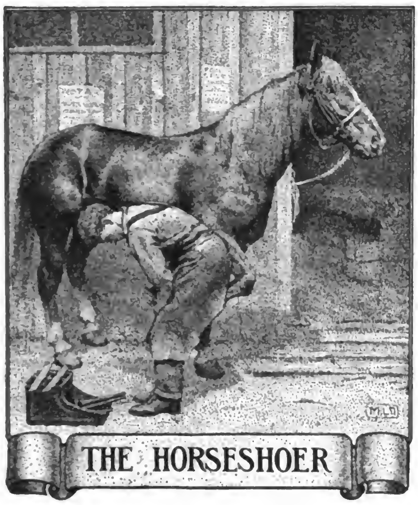
He comes in and proposes to take your order for a house in Chicago, sometimes in Racine and sometimes elsewhere, and he wants $20.00 down with order and a district contract.

You turn him down on that proposition and he is fixing, meanwhile, his sample to sell you. He has some old, brassy looking metal and applies his

fluid to it, and in about two minutes he rubs it up until there is as pretty a silver looking piece as you ever saw.

I think the trick is this: He has a silver article thinly plated with brass, and when he applies his acid it cuts the brass and leaves the silver beneath. He tells you, you must saturate any article in vinegar twelve hours before applying the fluid, as that thoroughly cleanses it. The twelve hours give him a chance to get away. If any of the trade have anyone come to them with such a proposition they will do well to have him arrested.

Editor's Note:—If any other of "Our Folks" learn of other fakers they will help us in our fight against them by reporting cases to us immediately. The best weapon against these sharpers is publicity, and we must have the help of our readers in protecting others against these unprincipled fakers.



Training the Speed Horse.

PAUL V. BURGESS.

In the October issue, Mr. D. M. Millan, of England, asks about the breaking and training of horses for pace and action. Mr. Millan does not state whether he has roadsters or speed horses in mind, but I take it that he refers to the latter class. He also wants the advice of a real trainer. I am not a trainer, but have done quite a bit of driving. It was my pleasure some years ago to do the shoeing for one of the large breeding and racing farms of our country, and I am perfectly familiar with the methods employed for breaking and driving.

In February the promising-looking colts that are to be two or three years old in the spring are first halter-broken and taught to lead and stand hitched. They are then fitted with what we call a bitting harness, which consists of a bridle, with overcheck rein, also back band and crupper and back strap. They are turned loose in a large corral with this rig on, and are left to fight it out by themselves. After they submit to this treatment, which usually requires from three to five days' time, they are hitched to a breaking cart and taught to drive. When they become quite well broken to the cart the real work begins. They must be hardened and toughened for their tryout in the spring, and it takes hard work and lots of it to get them in shape. They are then taken to the shoer and fitted with a light set of road shoes, after which they are given about five miles on the roads or track each morning. They are seldom driven in a walk, but are most always jogged in a trot or pace and walked only to cool out. After a few days the miles are increased until, later in the season, when the warm days are near, they are able to do fifteen or twenty miles in a fast jog and come in in good shape. Consequently, when the time for the real test comes—usually about the first of May—they are as hard and tough as nails, and are ready for their first tryout on the track.

This is the time that all the men on the place have been looking forward to—trainers, rubbers, stable-boys, cook, and last, but not least, the owner of the "whole works." The man who has been putting up the money for all this wants to see how they behave, and what prospects there are for developing a few winners out of the number. And right here let me say that they don't all make good. Not by any means. If they did we would soon be overstocked with speed horses. Only a few develop all the necessary requirements for a real race horse. The first requirement is a long stride. No colt can ever develop speed unless it is naturally possessed of a reasonably long stride. Then, it must also be able to "gather in" quickly, as we call it. If a colt has not sufficient muscular development to enable it to work its limbs very rapidly it cannot become speedy. And, again, it must not be too faulty in its conformation, or else it will not travel cleanly, and may have faults that the shoer cannot overcome. And this is where the shoer has to get in his fine work. Unless he fully understands the conformation of the horse, and how to treat each and every case, as its needs may require, he will not be able to aid the trainer in making useful some very fast colts that are faulty in their action.

There is one thing that must be understood, and it is this: that the best trainer and shoer in the world cannot develop a race horse unless he has the necessary requirements with which to begin. He must possess grit, stamina, lung power, and an obedient and tractable disposition. No two horses are alike. Each one possesses individual characteristics, and no two can be handled just alike. Some colts have the speed and can show a very fast quarter, but haven't the lung power or stamina to go a full mile. Others, that never show a great burst of speed, are able to go a fast gait from start to finish, and for that reason are always well up in front. But, when you get one that has all the good traits—speed, faultless action, stamina, grit, even temper, a willingness to work hard and a disposition that does not easily get rattled or sulk when he it hard driven—you have one that is worth a fortune, and the owner is sure to realize a large amount in the sale of the horse.

Should Horses be Clipped?

S. L. H.

A sufficient answer to this question would seem to be the increasing popularity of the practice; for any observant person will have noticed that horses are

A NEW JERSEY SMITH AND HIS FORCE OF HELPERS

clipped in numbers that increase with each succeeding year, and not only light horses whose work is at a fast pace but heavier and slower-moving animals whose labor causes them to sweat profusely. Yet each recurring season brings to the front the question of the desirability, or otherwise, of clipping. The principal reasons adduced against the removal of the coat is that it is contrary to Nature, and that a horse that has been clipped is more likely to take cold than the animal left in possession of its winter coat. Those who allege that clipping is unnatural are scarcely logical, because they ignore the fact that the horse was not designed by Nature to labor in the service of man in a state of domestication, but to live a wild, free life on the open prairie or in the wild forest, where it is not always summer and food is often scarce. Under these conditions, the thick, heavy coat is essential as a protection against cold, but when the horse is put to work the conditions are entirely changed. We provide him with a warm, very often hot, stable; we feed him on grain which is better calculated to maintain the animal heat than is watery grass; we can provide him with an artificial covering to replace Nature's provision which we have removed and, above all, instead of leaving him to walk about leisurely in search of food, we ride and drive him fast and far—impose heavy burdens and cause him to work and sweat under conditions which Nature never contemplated.

The assertion that clipping predisposes to cold is not warranted by the facts; indeed, experience goes to show that exactly the reverse conditions prevail. There are, or should be, three ways of looking at the subject of clipping. How it affects the health of the horse, how it affects the work of the animal which, of course, have an important bearing on each other, and how it affects the convenience of the owner—to whom time is money—and the labor of his help. The late Professor Williams, a practical veterinary surgeon as well as a brilliant writer and successful teacher, in his "Principles and Practice of Veterinary Surgery" says: "With reference to the clipping of horses I am of opinion that it is a great advantage. They work better after being clipped; thrive on less food; are less liable to disease; are stronger, healthier and more cheerful and, when sick, recover in a much shorter time."

THE SUBSTANTIALLY BUILT SHOP OF MR. G. W. PIPER OF MICHIGAN

There is no possible doubt that the health of the horse is affected by being permitted or compelled to wear his thick, heavy coat when the work is so fast or so hard as to cause profuse perspiration. This causes debility and reduces the strength, and after frequent sweating after return to the stable, of course, aggravates the evil and predisposes to colds. As to how it affects the work—the horses that are clipped do their work with much greater ease than do those who have their long coats on, especially when the weather is "muggy" and the roads are heavy, at which times the coat is a great burden. The underbred horse, which carries the heaviest coat and is frequently of a sluggish disposition, is often improved by clipping—not so much because the removal of the hair permits the whip to fit closer to the skin, but because it seems, in some unaccountable way, to beneficially affect the constitution. Any practical horseman knows what a tedious job it is and what an amount of really hard work is associated with getting a horse dry when it returns to stable with its long coat dripping with perspiration, and the animal keeps sweating; also that to leave the animal in this wet state means to risk pneumonia and other respiratory diseases. Every horse that sweats profusely at its work (and individual animals differ considerably in this respect even under same feeding and management, and suffer in health and condition in consequence), should be clipped and artificially clothed when standing about and in the stable.

Training and Shoeing Race Horses.

LESTER W. SIMS.

The proper time and age to start the development is with the youngsters, as a rule about two years old, depending, of course, entirely upon the conditions of the subject to be trained. To be sure, some at this age are not fit to be trained, in view of the fact that they are exceedingly "growthy," as we may term it, a weedy, sappy growth. Training of any consequence to this particular kind will result in more harm than good, while one of the smaller, compact, rugged type with a clean, flinty set of legs may do well. As a rule this type has a more rapid, snappy way of going, and comes to speed much faster and easier than do the growthy ones.

As to the method of developing speed it is best accomplished by the "brushing system," of short, quick work (like all other things by one who knows how). However, do not work the youngster until he is perceptibly tired, as they soon grow stale and, instead of making speed, will "train off;" so when one is growing dull or stale, that is to say, stops improving, you then have the "Indian sign." Just let him off training for a run in the paddock a few days, when he will come back with all the old speed and even more, and will "train on."

As to shoeing these horses properly, would say that this one question is usually mystifying to 99 per cent of the men in the profession. There is, however, a perfect system of scientific horseshoeing, and I, for one, am deep enough into the subject to appreciate the fact, although to accomplish it is a task equal to reaching the North Pole. To explain in a brief way, and to outline, we will suppose (as is sometimes the case) our subject is shod with just enough weight of iron to merely protect his feet, and

THIS SMITHY IS LOCATED IN WESTERN AUSTRALIA

is a most perfect piece of machinery, while if shod any other way will not go as well. (Note: Any additional weight, if evenly distributed through the shoe, will not change the action, but will cause more action, because the weight causes exertion, which in turn creates action.)

You will note as we proceed that there is a system to the distribution of weight in the shoes of two subjects of extremes in gait, our first to be one with the feet trimmed down naturally and only enough iron to protect the feet. Yet this horse is long gaited and low going, dwelling in front. Now if you will shorten his toes and make a wedge-shaped shoe, that is to say, a shoe thick at the heels and thin towards the toe, or a rolled toe or a toe squared back (box toe), you will quicken the stride or break over, and the more weight you place at the heels, the higher he will fold. Yet these may not be exactly adapted to the case. To properly balance the action it may be necessary to use a four calk rolling motion or the Memphis Bars adjusted to suit the case. At all events it requires experience and knowledge to be successful at even gaiting and balancing the trotter or pacer.

Now for the other extreme. With a natural foot and only iron enough to protect the feet he folds extremely high, does not extend out in front—in other words, goes up and down too much in the same place (like a churn dasher). In this case we have one that needs more toe, the toe grown out long—or extension of toe, the heels not high. A long, sharp grab around the toe of the shoes will prevent folding high, and the weight of shoe is to bear extremely at the toe. A toe weight will aid in carrying out and extending them in front.

While this doesn't carry much of real scientific training or shoeing I hope it to be plain and to cover satisfactorily the points of inquiry.

I have devoted my whole life to study and every-day practice on this particular subject, and have been very successful both as a shoer and trainer, having trained and raced one animal to a record of 2:10 before I was twenty-one years of age. I also captured two world's records.

Casehardening: The Materials, the Work, the Equipment and the Product—2.

J. F. SALLOWS.

A great many have a wrong idea in regard to casehardening different grades of steel. Some hardeners think the same treatment will do for all grades, but not so. For instance, 15 carbon open hearth steel should not be given the same treatment as 25 carbon. Or 25 carbon steel should not be given the same treatment as 35 carbon, and so on. The higher the carbon, the higher the carbonizing heat must be, and the reheats must also change with the advance in carbon. If the piece to be casehardened has to withstand shocks and strains, such as steering spindle bolts and like parts used in automobile manufacturing, these pieces should be set out to cool in the same box as they were carbonized in, and reheated at 1600° F., if they were carbonized at 1700° F., and quenched. This restores the core, making it tough, but it will not harden the case as hard as it should be, so we heat again at 1400° F., and quench to harden the case. This treatment is necessary where the carbon content is as high as 25 point or higher, but parts used for ball races or cones and such pieces as have to be ground and remain glass hard will be found to prove satisfactory if treated in the following

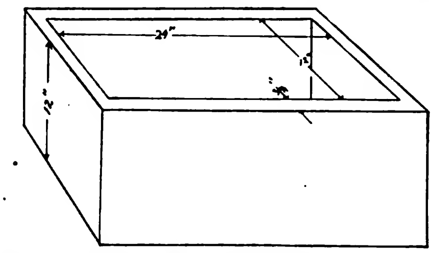


FIG. 1—THE BOX MAY BE TOO HEAVY

manner: Carbonize at 1650° F. or 1700° F., set out to cool; then reheat at 1500° F., and quench. Or, very good results may be obtained by dumping directly from carbonizing furnace.

The writer has read of hardeners getting a case from $\frac{1}{16}$ to $\frac{1}{4}$ inch thick for locomotive work. They use a box with walls about 1 inch thick and large enough to hold two or three bushels of all kinds of parts. These, it seems, are all piled in the large box and covered with hickory charcoal, potash, and goodness knows not what isn't recommended. The fire is then started and after the box has been subjected to two or three days of heat varying from 1200° F. to 2000° F. the fire is put out and the pieces are taken out and quenched in a trough of dirty water. This is considered a pretty good job by the fellows in the locomotive shops, but if they were doing hardening for automobiles where everything has to stand a rigid inspection they would

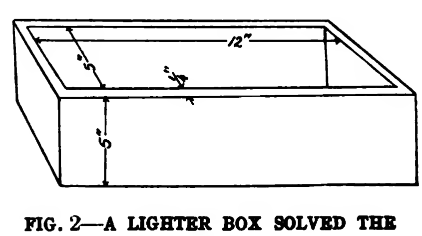


FIG. 2—A LIGHTER BOX SOLVED THE PROBLEM

have to adopt more modern methods. In the first place, from seven to twelve hours at a steady heat of 1700° F. is plenty to put a case deep enough for any class of work used in automobiles or locomotives or in any other class of work, but we cannot do this unless we use the modern carbonizing mixtures of today instead of using such stuff as was used in bygone days. We might as well talk of using the cradle or sickle for cutting grain instead of the modern machinery. Still, it is not more than two or three weeks since the writer read this article by a hardener in a large shop where they build locomotives. A short time ago the writer was called on to explain why results could not be obtained on a class of work composed of small parts. The trouble was they could not obtain the desired thickness of case on all parts alike. Some would have a case of about $\frac{1}{64}$ inch, while others in the same box would have none at all. They blamed the carbonizing mixture, the steel and everything in connection with the job. When looking up the trouble it was found they were packing about a bushel of the small parts into a box like the one shown in Fig. 1. The walls of this box were $\frac{3}{4}$ inch thick, and the inside dimensions were about 12 inches high by 12 inches wide by 24 inches long. There was metal enough in the box alone to absorb all the carbon the mixture contained. This box was packed full of small parts, and after luting on the cover was placed in an oil burning furnace at 7 A. M., and at 5.30 P. M. of the same day the furnace was turned out. The next morning the boxes were removed from the furnace and fresh ones put in. Now, the parts in the middle of this large, heavy box were not even red hot at 2 P. M., how could they expect a case on work done in this way? After making boxes about as shown in Fig. 2 and putting more of them in the furnace, even putting in two tiers, the parts were found to have a uniform case and the trouble was overcome. This is another point in favor of the coal burning furnace for case-hardening. Fig. 3 shows a double B. & S. coal burning furnace as it looked at 6.30 A. M., and the pyrometer registered 1350° F. at the time; the furnace having been fired up at 5.30 the evening before. When in a rush for hardening in the busy season we cannot get results from any kind of an oil furnace unless they are run day and night, and this means quite an expense.

Another bad practice is putting work

5610

REO MOTOR CAR COMPANY
HARDENING DEPARTMENT

Furnace No. 3 · Carbonizing
When Filled 3.P.M. 11-14-10
Contents 1 R.D. 42 - 3 R.B 44 - Special

Time	4 PM	5 P.M	6.30 A.M	8 A.M	9 A.M
Temp.	1400	1500	1350	1500	1550
Time	10 A.M	11 A.M	11.30 A M		
Temp.	1600	1650	1700		
Time					
Temp.					

Remove at 11.30 A.M. - 11 - 15 - 10
Foreman Sallows

FIG. 4—THIS FORM ON BLUE IS THE CARBONIZING RECORD

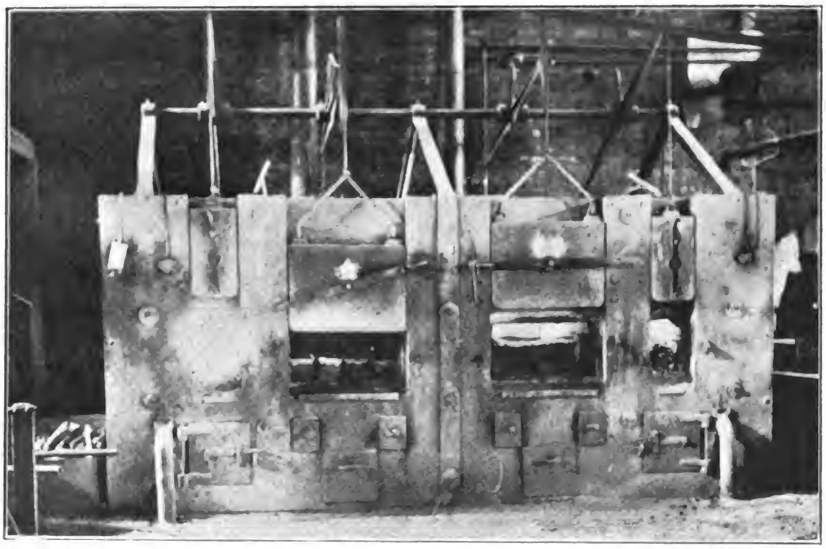


FIG. 3—A DOUBLE B. & S. COAL FURNACE IN OPERATION

5609

REO MOTOR CAR COMPANY
HARDENING DEPARTMENT

Furnace No. 2 Reheating
When Filled 2.30 P.M. 11-14-10
Contents 3 RB 30 - 3 RB 38 + 2 RB [illegible]

Time	3 P.M	4 P.M	5 P.M		
Temp.	1500	1550	1600		
Time					
Temp.					
Time					
Temp.					

Remove at 5.30 P.M. 11-14-10
Foreman Sallows.

FIG. 5—THE REHEATING SLIP IS PRINTED ON PINK

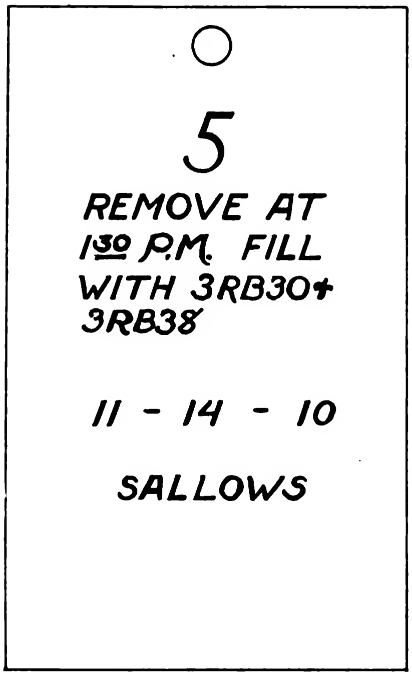


FIG. 6—THIS IS THE FURNACE TAG

in a furnace and guessing at the temperature and time. This work cannot be done by guess work any more than we can guess the amount of steam pressure in a boiler. Look at Fig. 4. This is a system slip gotten up and used by the writer and is the first in use up to the present time. This, as can be seen, is a good method for keeping track of the time, temperature and contents of the furnace instead of trusting to memory. Fig. 5 is a similar slip for reheating. The slip for carbonizing is blue and the one for reheating is pink. Then we have another slip which we fill out and hang on the furnace when we want the contents removed and the furnace refilled. This is seen in Fig. 6. This does away with any chance for mistakes and a lot of talking. Have a blank tag, punch a hole in the top and fill out as follows: put the number of your furnace at the top and "remove at 1.30 P. M., fill" with whatever you wish to put in next as the case may be. Then fill out another slip like Fig. 4. Those slips can be filed away for future reference, and a year after you can tell just what you did with a certain class of work at a certain time.

FIG. 7—SHOWING HOW THE THERMO-COUPLES ARE CONNECTED WITH THE FURNACE

FIG. 8—THE PYROMETER AND SWITCH MOUNTED IN BOX

Fig. 7 shows where the Thermo-couples are connected with a coal burning furnace. They are in the back in center of the oven just high enough to be out of way of boxes, and the heat is about as uniform here as anywhere. Then run the wires from the couples through small pipe over to the pyrometer at your desk or other place of business—see Fig. 8. This is an eight-throw switch and is connected with seven large furnaces. The pyrometer is in the same box, also a switch for turning on a light, arranged so when you get through reading the pyrometer and close the box the light is out and the connections are off the pyrometer.

Now, we want to show you how to avoid any jar or vibration to the pyrometer, this being a very sensitive little instrument which must be kept level at all times in order to read correctly. We have had them on the wall and on a post in the ground, but every blow of the steam hammer would put it out of level and it was quite a bother until we fixed it as we now have it. There is now not the slightest jar to it no matter how much pounding is done in the same room. Look at Fig. 9—This stand consists of two pipes, one inside of the other and about ½ inch clearance between the outside and the inside pipe. Then stuff candle wicking between the pipes for about 6 inches down from the top. The hole below the floor is about seven feet deep. Place the small or inside pipe on bottom and pack cement firmly around this for about 12 inches up, then place large or outside pipe down on top of the cement in bottom as shown. Fill the hole with cement even with

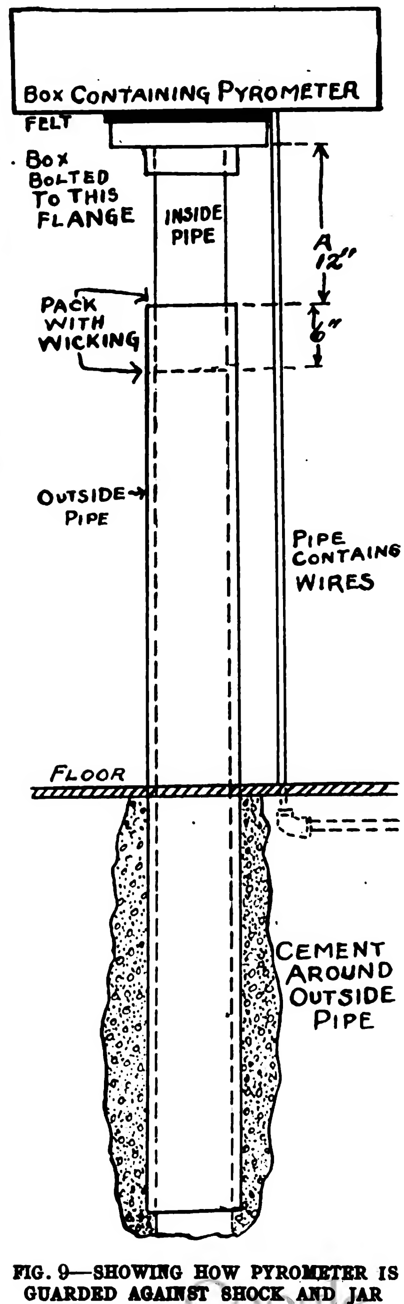


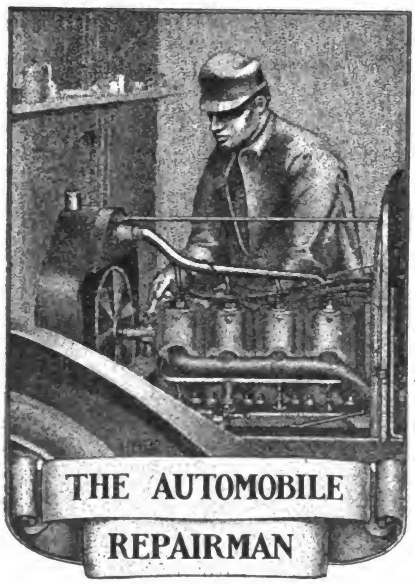
FIG. 9—SHOWING HOW PYROMETER IS GUARDED AGAINST SHOCK AND JAR

the floor line and let it get hard. Then the box containing the pyrometer and switch may be bolted on to the pipe flange, but place a piece of soft felt, about ½ inch thick, on top of the flange for box to sit on. The outside pipe should be shorter than the inside pipe by 10 or 12 inches—See A, Fig. 9. After everything is in shape it will be found that the ontside pipe will take up all the vibration of the room and the inside pipe will get none whatever.

In our next article we will take up the treatment of steel such as drop forgings before and after machining, also the best grades of steel to use for certain parts of the automobile.

(*To be continued.*)

MR. J. C. STURTEVANT'S GENERAL SHOP, OF OHIO



An Example of Brazing.

S. J. PEMBERTON.

The accompanying engravings show what sort of work we are called upon to do occasionally and also how well we do it. This is an automobile cylinder that became broken on the end as shown. In the picture showing the repaired cylinder one would have difficulty in locating the former break. If any of our brother craftsmen doubt the story told in the engravings we would be glad to have them visit our shop at any time and to have them investigate. The pictures leave little or nothing for us to say, so we will await the comments of our brother readers.

Adjusting, Repairing and Caring for the Automobile—2.

With Special Reference to the Packard Car.

The Gasoline System.

After leaving the float chamber the gasoline passes through a nozzle, from which it is sprayed into the mixing chamber. The mixing chamber is simply a cylindrical chamber around and above the spray nozzle. It is surrounded by a water jacket, through which passes warm water taken from the water circulating system by means of a pipe, leading from the rear cylinder water jacket cover. This maintains a uniform temperature and insures efficiency in mixing the sprayed gasoline with air to form a combustible mixture of air and gasoline, such as ordinarily is called a gasoline vapor. The action of the carburetor is simple. The suction, created by the cylinder pistons, draws air into the mixing chamber through both the primary and the auxiliary air inlets. This air enters the mixing chamber around the nozzle and picks up the gasoline that is sprayed through the latter. It is important that the proportion of air and gasoline in the mixture be correct for all motor speeds. Consequently, although the primary air inlet is open at all times, the auxiliary air inlet valve is controlled by springs so that while the valve opens only slightly at low speed, the increased suction effect of high speed opens it still more, letting in the greater amount of air required to maintain the correct proportion of the mixture. The carburetor thus automatically produces the correct mixture for all motor speeds, the auxiliary air valve adjusting lever on the dash being used only for the regulations of the mixture for starting and to suit different atmospheric conditions.

The auxiliary air valve is in a cage on the outer side of the carburetor. It is controlled by the tension of two springs, one of which is within the other. Regulating the tension of the springs adjusts the action of the valve. A wedge underneath the springs controls their tension, and this wedge is connected with the auxiliary air valve adjusting level on the dash. Turning the auxiliary air valve adjusting lever on the dash toward "Gas," provides a "rich" mixture; turning it toward "Air," provides a "rare" mixture. If the lever is turned too far toward "Air," the consequent rare mixture may cause "spitting back" into the carburetor. If it is turned too far toward "Gas," the consequent rich mixture may cause irregular firing and possible overheating. Experience will dictate the best position for the most efficient running under different conditions. Clean the auxiliary air valve stem frequently with gasoline, so that it always will work freely. If the valve sticks, it may cause any or all of the above irregularities.

To assist starting in cold weather, there is a shutter in the primary intake on the forward side of the carburetor. This shutter is operated by a button beneath the radiator at the right side. Pulling this button forward closes the air intake and allows a rich mixture to be drawn into the motor cylinders. This button should be pushed back and, consequently, the air intake opened, as soon as the motor is started. The throttle valve is of the butterfly type and is located in the mixing chamber, above the spray nozzle. It is controlled by the hydraulic governor, by the throttle hand lever on the steering wheel and by the accelerator pedal. The throttle valve does not regulate the quality or richness of the mixture, but simply the amount supplied to the motor cylinders through the inlet header. The hydraulic governor is of the diaphragm type and is located directly above the water pump. It is operated by the pressure of the water in the water circulating system. It consists of a circular chamber divided by a flexible diaphragm

of leather and rubber. On one side of the diaphragm is a water space, through which passes the water of the circulating system. On the other side is an air space and a plunger head, against which the diaphragm presses. The plunger is directly connected with the throttle valve. If a decrease in the load on the motor causes its speed to increase, the pressure of the water, circulated by the pump, increases and, consequently, the diaphragm exerts more pressure toward the rear, tending to move the plunger and thereby close the throttle. As the motor speed decreases, the water pressure against the diaphragm is lessened and the throttle may open. If the load on the motor increases, the opposite action of the governor will result. The governor prevents the motor from racing when the load is removed, by throwing out the clutch or stopping the car without stopping or shutting down the motor. The governor also tends to maintain a constant speed of the car within the limits of the hand throttle setting when running under varying road resistance. The action of the governor is an indicator of low water in the radiator, as will be explained. When the engine is stopping, the governor tends to open the throttle and thus assists in charging the cylinders, so that the motor will start easily.

On the right side of the steering wheel is a hand lever which directly controls the action of the throttle. Moving this lever forward along its sector, toward "Open," increases the speed of the car, while moving it backward, toward "Closed," decreases the speed. Between the clutch and brake pedals there is an accelerator pedal, to be operated by the right foot. It provides for immediate speeding up by opening the throttle. The accelerator pedal is the usual means of controlling the speed of the car. When pressed downward for increase, or released for decrease of speed, its action is instantaneous. When the accelerator is released, the motor immediately resumes the speed determined by the position of the hand lever on the steering wheel. The governor, in turn, checks or controls the speed of the motor within the limits of the hand throttle, as described above. Although either the throttle hand lever or the accelerator pedal may be used to control the speed of the car, the use of the hand lever is advised for beginners. After confidence in driving has been gained, the more delicate and more nearly instantaneous action of the accelerator will be preferred. In continued fast driving, the throttle hand lever may be advanced part way to increase the minimum speed to any desired point, so that the accelerator pedal need only be used to obtain speeds higher than this predetermined minimum.

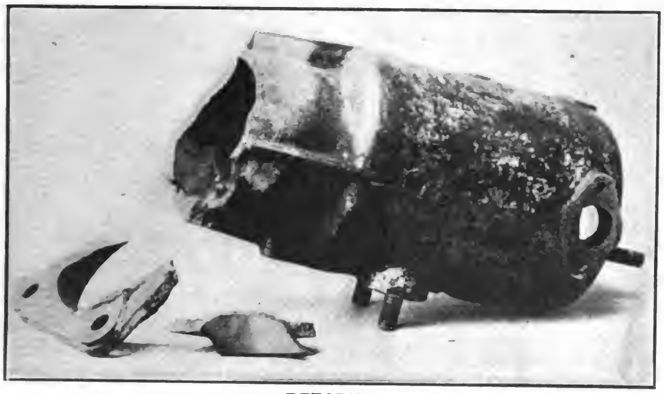
There is a by-pass around the throttle valve which allows a small amount of mixture to reach the motor cylinders, even when the throttle is entirely closed. This by-pass supplies the minimum amount of mixture for the slowest running of the motor. It is provided with an adjustment for the increase or decrease of the minimum speed of the motor. To increase this minimum speed of the motor, loosen the check nut and screw the by-pass plug upward. To decrease the speed of the motor, screw the by-pass plug downward. There is no ordinary occasion to change the adjustment of the throttle by-pass.

(*To be continued.*)

The Value of Good Craft Books.

PAUL V. BURGESS.

I often wonder how many of the readers of THE AMERICAN BLACKSMITH have availed themselves of the opportunity so often given them to read the many good books published in the interest of every branch of the trade. Brother, if you have never read and studied one of these text books, you have missed a rare treat, and have passed an opportunity to broaden your knowledge and become more familiar with the particular branch of the trade in which you may be interested. While I am not writing this article in the interest of any certain writers, I will mention here a few of the works I have used, and they are highly commended by the instructors in forging at many of the leading trade schools. For the general blacksmith, John L. Bacon's book, "Forge Practice," is an excellent work, and is sure to be of great benefit to anyone who reads it. It deals with shop practice in a thoroughly practical manner, yet it contains much technical knowledge that you will never know unless you read and study it. Then, for the blacksmith who handles steel, take Markham's book, "The American Steel Worker." This book treats of steel in all its elements; also contains much valuable aid in tool making, as well as tempering and the different heat treatment of different grades of steel. While there are many other good books on steel working, there is none better than this, and it should be in the library of every up-to-date blacksmith. For the horseshoer, there is "Rich's New Artistic Horseshoeing." It is a good book, and any shoer who reads it is sure to be a better workman and will have a more intelligent knowledge of the horse and how to shoe it. Mr. M. C. Hillick's work on carriage painting is good and worthy of a place with the best. There are many other good books I might mention, but space forbids. You can, no doubt, get a complete list of books by writing to the editor. The long winter nights are here now, and a few good books on the

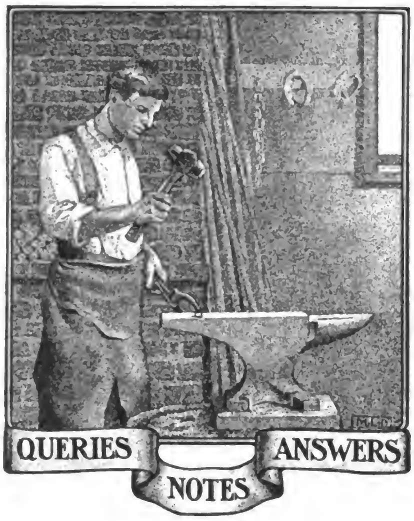


BEFORE

AFTER

SOME BRAZING WORK DONE IN THE SHOP OF MR. S. J PEMBERTON, OF KANSAS

different smithing subjects will be good companions for you during this time. They contain much food for thought, and by reading them, you will become a better and more intelligent workman.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

Wants a Special Shoe.—I should like to know the best shoe for a stiff lower pastern joint. D. F. McCormack, Massachusetts.

Some Aluminum Questions.—How can I solder aluminum and also melt it. I have a piece I would like to melt and cast some articles. H. D. Lindemuth, Pennsylvania.

Has Trouble with Engine.—I would like to know what is the cause of a gasoline engine backfiring, and where does the shooting take place. O. R. Manville, Missouri.

Wants a Tire-Heating Furnace.—I would be grateful for any information regarding a furnace for heating tires in the shop—what it should be built of and in what shape. E. Baseler, Iowa.

Wants to Temper Drills.—Will you kindly let me know what kind of bath to use for tempering steel for very hard granite rock for steam drills? Any information on tempering steam drills will be greatly appreciated. W. K. Langford, Virginia.

Has a Club-Footed Animal.—I want to ask for information. I have a colt which is club-footed in one foot. Can some one tell me of a treatment which will bring the foot back to its natural position?

C. F. Fry, Georgia.

Shoeing a Horse To Change His Gait.—I should like to know if there is any way to shoe a pacing horse to make him trot or of shoeing a trotting horse to make him pace. William R. Taylor, Delaware.

A Question on Shoeing.—I should like to ask the craft whether a shoe should bear on the bars or not, and if the outside heel should be a trifle lower, as some judges at competitions seem to prefer.

W. J. Varcoe, England.

A Question on Gas Engine Power.—How can I test the power of a gasoline engine to ascertain its horsepower by some simple and inexpensive means, and will the test work on large as well as small engines?

F. O. Curtis, Nebraska.

To Soften Hard Paint Brushes.—A good way to soften dried paint brushes is to put the brush in boiling water. In a few minutes it will become soft, after which it should be worked dry. Put a few drops of turpentine on the brush and it will be in good working condition. O. R. Manville, Missouri.

A Question for Painters.—I should like to know through The American Blacksmith how to make hard putty, and also what is the difference between gold size and coach Japan. I know they are both used as dryers, but what is the difference between them? J. Piercey, Ontario.

Is This Correct?—I make up a lot of bill hooks and axes, and occasionally one of them cracks in the hardening. I believe this is due to my getting it too hot. I get them blood red and cool off in rain water, then lower to a coppery straw. Is this method correct?

William A. Pearson, England.

How To Bend Timber.—Regarding the bending of timber, the most successful method I have found is to boil the timber in water and muriatic acid. To six gallons of water use four ounces of muriatic acid and bend while hot. Would be pleased to hear what success other smiths have with it. F. L. Robbins, Ohio.

Repairing Shaft Irons.—To T. J. Steadman, who would like to know how to weld shaft irons that have become broken and which he has to hammer down too thin, I would say my way is to upset the broken ends, weld a piece on the end of one of them and then weld the two pieces together. work them down and you have a good job. Monroe Hibbard, New York.

How To Repair Shaft Irons.—Replying to this question, I heat the place which I intend welding, put in a tire shrinker and upset. After heating, either weld a piece on the crossbar strip or make a new piece and weld, drawing so the holes will fit on bolts. If the holes are closed, drive a punch in them while the iron is hot.

W. H. Crumly, Indiana.

Shoeing a Lame Horse.—I want to ask the craft a question. I have a gray mare to shoe which is lame in the right front foot. The foot looks all right and there is no sweeney. I have shod her with a bar shoe, but it has had no effect. Have also shod her with a common shoe and have sprung the heel. She does not go lame except when trotting. Chas. F. Koskey, Pennsylvania.

Tempering Gun Triggers.—I should like to know of some composition that I could use to temper gun triggers. Any information on this subject would be gratefully accepted. Claud Monti, Mississippi.

In Reply.—Oil is generally used in tempering gun triggers. There may, however, be some special tempering baths used by some other reader, and if so we hope he will pass the information along.

E. G. F., New York.

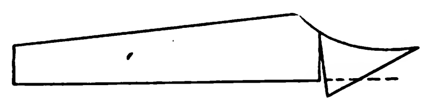
Wants a Double Hearth and a Tuyere.—I should like to receive from the readers of your valuable paper particulars regarding the building of a double fire hearth; the correct width between the fires, and also the height. I wish to use it for tire heating and general work. I would also like to hear from some one as to which is the best tuyere iron to use for plow work.

George A. Cummings, North Dakota.

Shoeing Horses in Colorado.—I have been living in the dry climate of Colorado for a year and find the horses' feet difficult to deal with. I have shod several different ways but find that the horses occasionally go lame. I should like to know just how a horse's feet should be treated in this Colorado climate. This winter, so far, has been very dry, but we will probably have a great deal of fine weather after Christmas. Would it be advisable to use "Never-Slip" Shoes?

E. Heincman, Colorado.

Questions for Everyone.—I want to ask some questions of American Blacksmith readers. I consider "Our Journal" the best of its kind. I look for it every month as if looking for an old friend. Here are my questions: 1. What class of people, as a whole, do you consider to be the best educated? Why do you think so? 2. What class of people has been of the most benefit to the world? 3. Why are "Bastard" files



A QUESTION ON PLOW FITTING

called "Bastard" files? How did they receive their name? Please answer through "Our Journal." J. B. W. Morris, Georgia.

Blower and Other Troubles.—I have a Royal H. Blower in my shop and find that it turns with great difficulty on these cold mornings, which is due, no doubt, to the oil becoming stiff. What kind of oil can I use that will not become stiff?

I would like to know of a way in which to weld toe calks to shoes and after drawing them out sharp still have them welded securely.

I find that I cannot weld the broken steering knuckle of the International automobile. It works like steel in scoffing, but will not stick. Does any one know of a process of welding that will be successful?

Bernard Schickling, South Dakota.

Several Questions.—I have fitted, or partially fitted, a share to a plow. It was a share with the landside welded on. When I attached it to the plow I found the point too high, i. e., above the line of the bottom of the landside on plow, as shown in the engraving. If I should cut the landside at the dotted line would the landside break loose from the share? Will some smith tell me how they fix a job like this?

When making a weld if the pieces seem covered with a fluid that runs freely but will not adhere, what is the trouble?

Which is tougher, soft steel, such as buggy axles, or Norway Iron? Which is better for making tongs?

Sandford E. Frazell, Nebraska.

Repairing Shaft Irons.—In your issue of October I notice a request from T. J. Steadman, of Florida, for the best method

of repairing broken shaft irons. The following is my method and a perfect job is always the result, whether it be a broken shaft iron or any other iron where it is necessary to keep the original length and thickness. First upset the stem or shank of the T in the vise and then make a short scarf. Take a piece of $\frac{3}{8}$-inch stock, scarf on the side about $1\frac{1}{2}$ inches from the end, cutting about three fourths through so as to break easily after welding. Weld the piece on shank or stem. This gives plenty of material to work on. Weld stem on and do not try to square up the corners as a fan-tail weld on a shaft iron is much stronger than a square one.

C. H. HEATH, Pennsylvania.

More Cold-Tire Setter Talk.—I have read so many articles on tire setting I cannot restrain myself longer. I have been setting tires for thirty years in different States. We all know that a tire must be from $\frac{1}{32}$ to $\frac{1}{2}$ inch smaller than the wheel, owing to the nature and the condition of the wheel, to set properly. Now, then, I want some cold-tire setter man to explain how he can make any tire smaller than the wheel and do it with the tire on the wheel.

I want to take a shot at Brother A. T. Wright, of Texas, who has been giving Brother Frank Hawkins, of Kansas, his experience on setting tires. Mr. Wright says he has a Brooks and can do more in one hour than a man can in half a day by the old method and do it better. Yes, he says "better." I wonder what he got for writing that article. I would be willing to bet that he learned his trade only a few years ago.

W. K. HUFF, Kansas.

That Axle and Wheel Controversy.—Brother Gunn says on page 68 of the December number of "Our Journal" that I am mistaken when I say it is wrong to gather axles. He also claims to be able to set a dished wheel on a plumb spoke and at the same time have the tire set flat on a level surface. I say he is mistaken on both propositions, and I have money that says so—so there! Brother Gunn, it seems strange that after having drawn the sketch you drew on page 68 you were not convinced of your error. Take the dished wheel shown on the same axle with the straight one and turn the picture upside down, showing the dished spoke on the lower side. Now, suppose you push it under until it becomes plumb, how will the tire set on the ground? I think I've said enough. You notice what I say in backing up my belief—I am from Missouri, and must be shown.

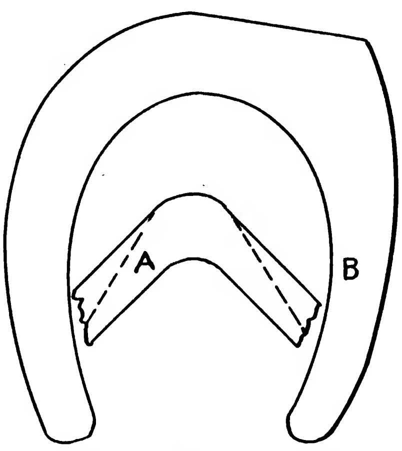
L. VAN DORIN, California.

Working Over Emery Wheel.—As one of your many appreciative readers I would like to ask how many of the craft, when working over an emery wheel, have thought of the serious effects that might result from getting particles of emery into the eyes. Of course, these particles can be taken out, but did you know that they leave a scar, and that in time, when the number of scars keep on increasing, they begin to impair your vision? If you have not thought of these things before, just stop and think of them now. You will readily see that what I say is true. I had my attention called to this matter by an eye doctor, while being tested for glasses. If you have worn eye glasses when working at an emery wheel you must have noticed what an effect it had on the lenses, and the eye is only a lens, only one cannot have the eye renewed with a seeing eye after it has become all cut up. A. L. ERICSON, Illinois.

Shoeing That Interfering Animal.—In answer to Mr. Boyes' question on interfering I would advise him to pare down the foot about $\frac{1}{4}$ of an inch lower on the outside. Make a pair of light shoes of $\frac{1}{4}$ by $1\frac{1}{4}$ tire steel, with most of the weight in the toe. If you must calk them, calk them very low down, the toe well back from the outer edge, and the calks a little lower on the outside than on the inside. They should fit snug, but should not rub the foot from the outside.

For the hind feet, pare down the hind feet the same as has been done with the fore feet. You can pare down a little more on the outside, leaving the inside toe as high as the heel, and a very light shoe with a snug fit around the heels. Your toe calk should be $\frac{2}{3}$ to the inside of the center of the foot, with the outer corner a little lower than the inner (this is to cause the horse to throw his foot outward), the heels to be the same. Leave the natural shape of the foot. Do not change the shoe too often; let him get used to them. Do not throw the outside heels on the shoe outward. This might help him if you have not already tried this remedy. One could tell better if he could see the horse from the back. Let me know if this helps your case, as I have another method which might perhaps work if this one fails. W. M. SCHNEIDER, Iowa.

A Special Interfering Shoe.—I saw in the October number of THE AMERICAN BLACKSMITH that E. A. Moulton & Son would like information about shoeing a horse that



A SPECIAL INTERFERING SHOE

interferes between the fetlock and knee on forward feet. We have used a kind of shoe that has never failed us.

This shoe is made from an old piece of buggy spring. For an ordinary horse use $1\frac{1}{4}$-inch stock, with no calks. We take the spring, cut it the length, bend it about one third of its length and cut off the sides, as shown in the engraving at A.

Work this shoe into shape, and I think it will stop your trouble. I think that probably you have noticed that when the horse picks up his foot he rolls it out on the outer corner, which makes it swing inward and strike his leg. The square corner of the shoe will prevent the rolling of the foot and it will come up square and prevent the interfering. MONROE HIBBARD, New York.

How To Make Polishing Wheels.—I saw an article in your December issue, written by Brother A. L. Ericson, giving his idea of an emery wheel. This kind of an emery wheel was good years ago, but is behind the times now. I want to tell you how I make them. I have wheels for different purposes—for cutting rust, etc. I take a piece of cardboard about $\frac{1}{8}$ inch thick (ordinary cardboard such as boxes are made from will do), and cut out plates the size I intend making my wheels. I pack one on top of the other until I get the desired thickness; then take my dividers, find center and cut out hole size of mandril. The next step is to cut two metal plates from No. 16-guage sheet iron, $1\frac{1}{4}$ inch less the diameter of the wheel. At a distance of 1 inch from the edge, all around and at equal distances from each other, I drill four $\frac{1}{4}$-inch bolts.

Now put one plate on the mandril, then the paper and last the other plate. Then screw the nut on the mandril. Now take a $\frac{1}{4}$-inch iron boring bit and bore through the cardboard at the holes in the plates, and bolt up, making a solid packed wheel. Make a steady rest and start up your power, using a draw-knife to true your wheel, as that is the best tool I have ever used for this kind of work. I make canvas and felt wheels in the same way. I have several of these wheels which I have used for years.

CHARLES H. GREEN, Iowa.

Blacksmiths and Blacksmiths.— Some of the brother smiths think that a man who has not worked from three to seven years under some old smith is no good. I wish to say that the greatest "botch" I ever saw served his time, and then about thirty years additional at the anvil. This man never would become a good workman if he followed the trade a lifetime. It simply isn't in him to be a mechanic. The smiths here in this part of the country are mostly self-made men who never learned the trade. Some of them are fairly good workmen, and some couldn't do a thing if they wanted to. These fellows do not take THE AMERICAN BLACKSMITH, or any other trade journal, nor do they read the trade books, and their work shows it. I will tell you how one of these fellows tempers tools. There is a mud hole in front of his shop. He heats his tool red hot (and the hotter the better), runs to the door and soaks it in the mud and water. Of course, the result is that the tools either break or bend.

I enjoy reading the articles by the veterans of the craft, such as W. H. Gunn and C. W. Metcalf, and would like to see their pictures in the Journal.

I made a bolt-holder, such as described in the June number by Mr. Vanarsdall, and find it does the work all right. I have several tools hanging around in the shop which I have made from descriptions given in "Our Journal" and find them all good.

DAVID E. HILL, West Virginia.

Tempering Grubbers and Some Comment.—In answer to Mr. C. Forno, of New Zealand, who asks how to temper grubbers, I wish to say that the best way is to heat them red, if cast steel, cool in linseed oil and draw temper to a blue color. The steel will not crack. Spades made of cast steel may be tempered in the same way.

"Ignition and Batteries," by Harold Slauson, on page 62 of the December number of THE AMERICAN BLACKSMITH is good, and "How to Retube Old Boilers," by "John, the Blacksmith," on page 64, is excellent. It is the correct way of putting in new tubes. This number is worth $5.00 to me in my trade. Thank you, a thousand times, John!

I have seen our friend, Mr. C. W. Metcalf's photo in the December number of THE AMERICAN BLACKSMITH. Thank you very much, Mr. Metcalf, but how about those "Fifty Lister Lays?" Does Mr. Jewett, of Nebraska, with the Lord, furnish us hot air, or will I furnish some cold air from Dakota? I have sharpened and drawn out seventy-seven lister lays and tempered them on a Star trip hammer in fourteen hours. I had a man polish the seventy-seven lister lays in fourteen hours. I have a double gas forge and a muslin polishing wheel with Turkish emery. Who can beat this, Mr. Metcalf? A. SMITH, South Dakota.

Blower Troubles.—Mr. W. F. Krummel, of South Australia, has trouble with a Champion 400 hand blower. I think his trouble is either in the wind pipe or the tuyere iron. I will relate a little experience I had. At the place in which I am employed we have a blower of this kind, and one time found that the oil from the blower had run into the wind pipe and the coal dust from the forge settled on the oil until the pipe was nearly clogged up, the coal dust going in through the blower with the air.

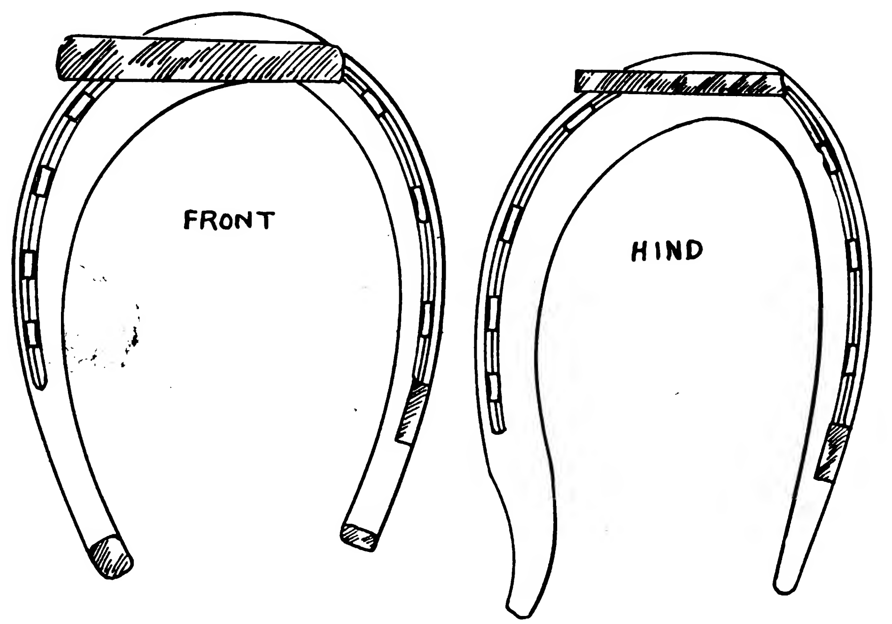
At another time we put in a tuyere iron, and the blower ran about twice as hard as with the old tuyere iron, because the wind pipe at the tuyere iron was about one half the size compared to its size at the blower, while the former iron had had a wind pipe the same size as the fan. However, we now have a Champion tuyere iron and the blast works all right again. The essential thing, therefore, seems to be to have a wind pipe about 3 inches in diameter, all the way from the fan to the fire, and avoid turns in the wind pipe, especially short turns, as much as possible.

I have been waiting for some time to hear from that fellow who can separate a weld so nicely. If he can actually do it why doesn't he say how, or we will have to continue to think him a hot-air merchant, who blows only with his mouth and not by actually doing the work.

Also that Englishman who talks about putting shoes on a horse and still retaining the same shoes in the shop. I want to ask Mr. Cochrane if he can do what he talks about. If not, what is the use of talking about such things which are of no use to anybody, unless these wonderful fellows tell some of the rest of us how they do their stunts. Nicholas E. Koch, California.

Some Valuable Hints.—I have been a subscriber to "Our Paper" for several years and wish to say that I certainly enjoy reading it. I have been in business twenty-seven consecutive years and still see that there are a great many things to learn about the business. One thing, however, that I have learned is that the smith who does a good job and gets a good price is the one who pays his bills promptly. I was talking to the credit man of one of the largest heavy hardware jobbing houses in the Northwest and he told me that less than ten per cent of the blacksmiths discounted their bills. Just try discounting your bills, Brothers, for one year, and see what it will amount to. The result will surprise you.

My shop is 30 by 50 feet and two stories high. I have two fires with two No. 4 blowers, a 6 horsepower Callahan gasoline engine, a power blower and a Williams & White 55 horsepower trip hammer. I don't know of a better machine than the latter. I have used it for six years and have never tightened or loosened a single bolt since I have had it. I can sharpen a 16-inch lay at two heats, running 250 revolutions per minute. I have also an emery and polishing stand, a Monarch disc sharpener, a small emery grinder for small tools, a Little Giant hand and power drill and a Barnes 26-inch sliding head drill press—one of the best drills made. By the way, I use Novo high speed drills sizes $\frac{7}{32}$ up to $\frac{9}{16}$, and find these are the drills for fast work. Of course, they are very expensive; a $\frac{9}{32}$ straight shank taper length costs 75 cents, but you can *drill* with it. I can take a $\frac{13}{32}$ and drive it through a $\frac{1}{4}$-inch soft-center plow steel without any cooling liquid. I mention Novo drills as these are the only ones I have used, though, of course, there may be others as good or better.



MR. C. H. EASTMAN RECOMMENDS THESE SHOES FOR INTERFERING

As a side line I carry pipes and fittings, brass goods, pumps, etc., also tools for cutting and threading. I also have all the other small tools that are necessary to the equipment of a first-class blacksmith shop.

I see in "Our Journal" that a good many smiths tell how they have made a trip hammer, band saw, etc., They had better make some good tongs and let the people who have made a life study of drills, etc., make them for their use, as they will not then have tools which will require a hammer and monkey wrench to repair whenever they wish to use them.

I buy my coal by carload. Try it, Brother, see what you will save. I burn it in shop stove for heating and my customers say that I have the best fire in town. Our prices are not very high: 25 cents for resetting; 40 cents new shoes; 75 cents sharpening and pointing plows; $2.40 for bolted tire; $3.00 for 3-inch truck; 35 cents sharpening and hardening plows, and other work in proportion. H. D. Widrick, Minnesota.

Shoeing for Interfering.—In regard to the horse you were speaking about in The American Blacksmith I would suggest that you make a set of shoes, as shown in the engraving. Take off the shoes which are on the horse at present, and have the horse stand on a floor which is level. Look at the feet, not letting them tip either in or out and getting them as level as possible. If the horse toes out, fit the shoes to the inside toe and take a little off the outside toe. This to be repeated every time he is shod. If you want to tip the foot, do it with the shoe. If you use a calk, have toe calk as long as you can get it between the nail holes and have calk clear up to inside nail hole. Straighten the inside of shoe from nail hole to end of shoe. Then straighten inside of foot as much as you can when you pare it and fit the shoe to it.

C. H. Eastman, New Hampshire.

He Speaks for the Cold Setter.—As I bought a Brooks Cold Tire Setter I wish to say a few words on cold tire setting, and if there is anybody from Missouri I can show them. I think that Mr. D. Ahutholz from Iowa and Mr. Crabtree from Missouri have the right idea on cold setting and, by the way, Mr. Crabtree is from Missouri, and he doesn't have to be shown:

I think that any fair minded smith who has ever seen a tire set cold and set the way it should be set would be convinced for all time, and would surely buy a cold tire setter.

Brother Richard Loades of Kansas says that he is trying a cold tire setter now, and that it does not look right to him to cold-stove iron, or kink it, as he expresses it. If his machine kinks the tire there must be something the matter with him or the machine. I can set a tire on my Brooks and set it so smooth that he could not find a kink with his glasses on. He also says that he is afraid that if you were to set a tire cold in the winter time when it is frosty that something might pop. Why can't he hold the tire over the fire for a few moments and draw the frost out? Even if a man should break one occasionally he can weld it again. I want to ask him or any other smith how many times they have set tires hot which, on becoming cooled off, have popped open in some old weld or crack. When this has happened it has been necessary to weld it again and you are out the extra fuel and a lot of valuable time and, no doubt, a few cuss words have been thrown in.

I have had my machine three months, during which time I have set nearly six hundred tires, breaking but three or four out of the entire lot, and in each instance, these broke in some old crack or faulty weld. I have had but two wheels come back on account of becoming loose, and these were so rotten that they could not hold a tire.

I want to give this piece of advice: Be sure to repair your wheel before you set the tire. If the spokes are loose see that they are tightly wedged, for if you neglect this on an old wheel the tire will soon become loose, and then there will be a complaint about the machine being no good. Don't throw the wheel at the machine and expect it to do the job and finish it in a minute. I, for one, am on the side of the cold setting and hope to see the rest of you fellows get over the fence when it gets too hot for you and set tires cold. You can do it easier and faster and with more profit, and you all know we need to gain in all these lines in our business.

I put in a Star 50-pound head hammer last spring and find that it paid me well. I did a third more plow work with it and did it better. I am now rigging my two fires with a power blower. I hope to see some more writing on the subject of cold tire setting. T. E. McCook, Iowa.

VOLUME 10

THE AMERICAN BLACKSMITH

NUMBER 6

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO N.Y. U.S.A.

MARCH, 1911

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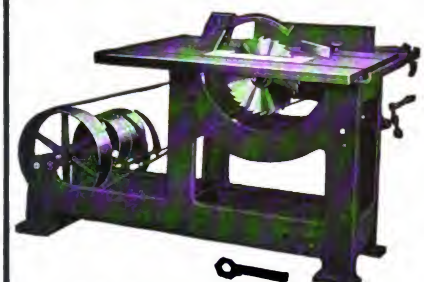

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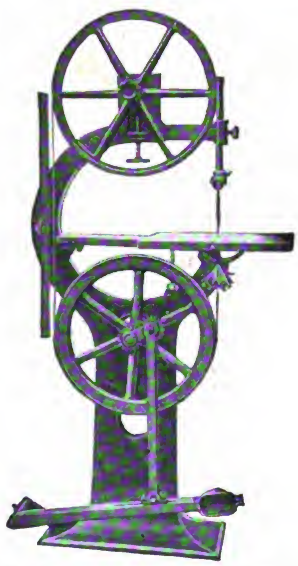

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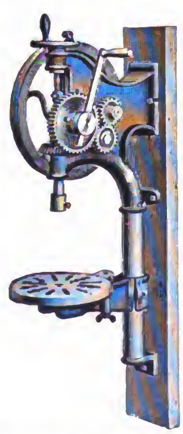

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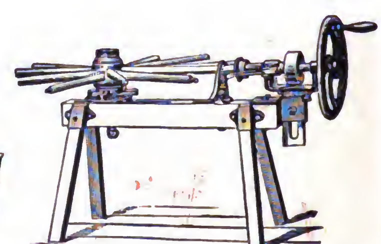

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The American Blacksmith is published monthly at The New Sidway Building, Buffalo, N. Y., U. S. A., by The American Blacksmith Company. Incorporated under New York State Laws. Entered, February 12, 1902, as second-class mail matter at Buffalo, N. Y. Act of Congress, March 3, 1879.

William F. Wendt, - - President.
Albert W. Bayard, - - Secretary.
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Subscription Price: $1.00 per year in advance, prepaid to any postoffice in United States or Mexico. To Canada and other countries, $1.50, or, 6 shillings. Reduced rates to clubs of five or more on application. Domestic long-time rates, strictly in advance: Two years, $1.60; three years, $2.00; four years, $2.50; five years, $3.00. Single copies, 10 cents. Cable address, "Blacksmith," Buffalo.

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Austin English, Secretary-Treasurer, Kansas State Association, Hutchinson, Kan.

The Blacksmith's Ten Commandments.

T. E. SHERIDAN, IOWA.

I.—Thou shalt pay the blacksmith all thou owest him, for he has nothing to lose.

II.—Thou shalt be all ready to bring thy work in before spring comes, for he has no time to lose.

III.—Thou shalt not talk to the blacksmith while he is working, for he has plenty to do.

IV.—Thou shalt not expect us to stand any breakage, for thee wouldst not stand any breakage for us.

V.—Thou shalt deal very gently with the blacksmith, for he is human.

VI.—Thou shalt not disturb him while he is sleeping, for he needs rest.

VII.—Thou shouldst not expect us to do all the work at once—call early and avoid the rush.

VIII.—Thou shouldst not expect too much charity, for it costs us time.

IX.—Thou shalt not dictate to the blacksmith, for he knows how to do the work.

X.—Thou shalt call on us when you want anything done, for we are here for business.

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Where Do You Stand?

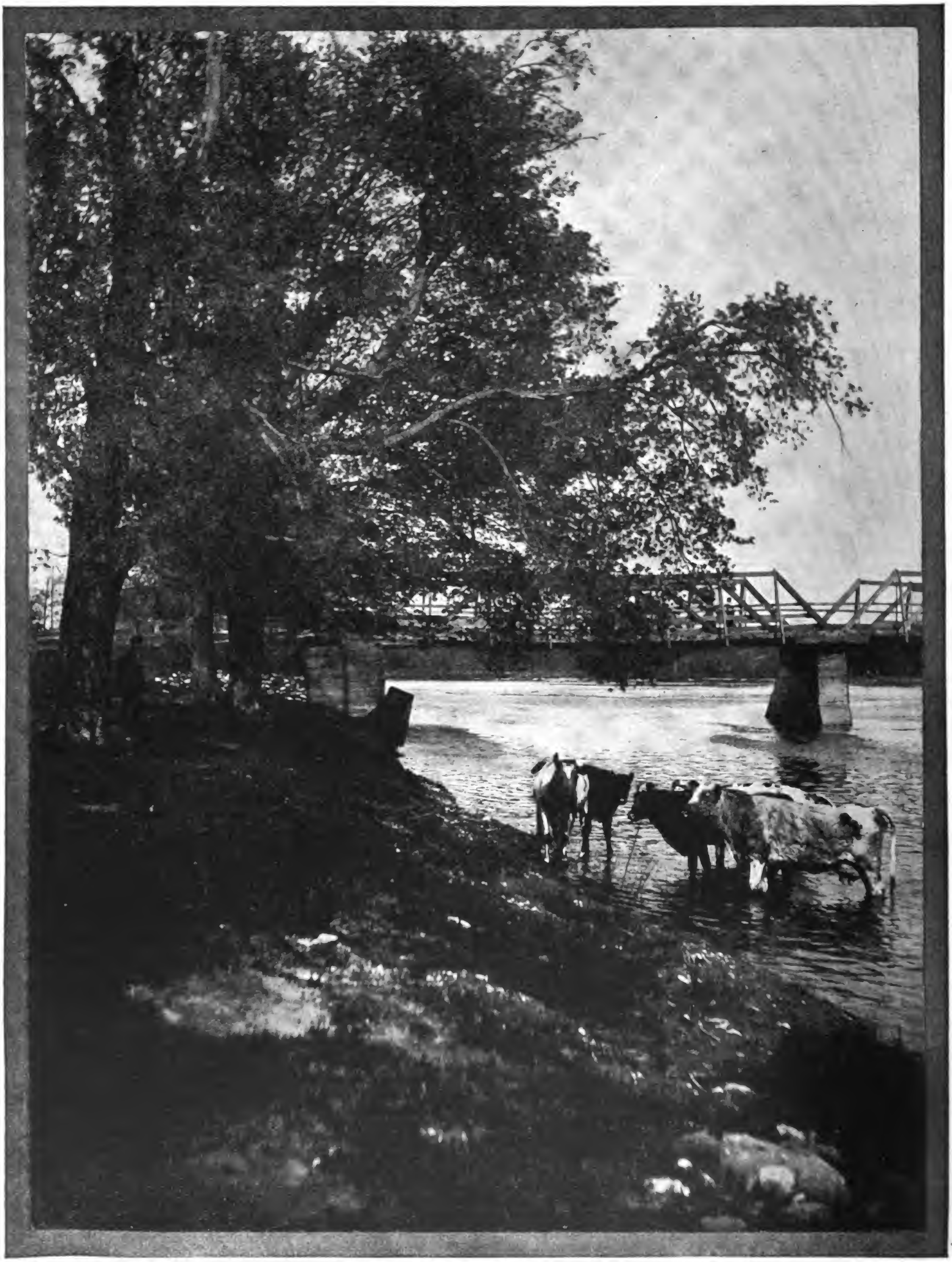
Where do you stand on the subject of parcels post? Are you willing to let the express trust overcharge and rob you? Perhaps you have had some experience with the express trust's system of overcharging. If you have, let us know the circumstances. We want to place some plain, indisputable facts before our readers and before the men at Washington.

As a start, we quote the following experience which a New Yorker had with the express trust. He tells how his wife handled a case of hold-up:

"My wife had already prepaid express charges of $1.15 on her trunk, yet when the driver delivered it at our town address he banged it down with a demand for 90 cents. I had the old receipt in my pocket and was about to produce it with an angry protest, but my wife paralyzed me with a look and sweetly counted 90 cents out of her handbag. When the driver had gone she said, 'Now let me have that receipt,' and before the wagon had turned the corner she had headed for the express office. She invited me to go along, but I felt she could better adjust a delicate matter like that without me. And she did. She came back with $1.15. 'Of course,' she said, 'I could have refused to pay at this end of the line, and if they had charged more than that at the other end I should have refused, but when the discrepancy was in my favor I just paid at both places, then went down and demanded the larger sum. With both receipts to prove that somebody in the company was trying to cheat, they just had to give my money back.'"

What do you think of such a system of charging? Do you want it to continue? There's a remedy, and that remedy is parcels post.

Parcels post enables the resident of Germany to send a package weighing eleven pounds anywhere in his country for twelve cents. The postal department in the United States makes you divide eleven pounds into three packages, and then charges $1.70 postage. Yes, and if you want to mail eleven pounds of anything to Germany you can do it, but you cannot mail the same package to your next town. Isn't that consistent? What pains and care our "Servants" at Washington have taken so the express trust is not disturbed in its monopoly.



A Modern Blacksmith Shop

An Ohio Smithy That Comes Very Close To Being Ideal

EVERY one of our readers may well study the accompanying engravings of Mr. Holben's shop, with profit to themselves and to the craft. It is so seldom that one comes across such a shop as Mr. Holben's that it is a real treat to describe it.

Looking at the exterior view, the reader gets some idea of the shop building. It will be seen that the doors and windows are fitted with screens. This is quite an innovation in smith-shop fixtures, and yet one that may be easily applied to any shop with evident profit. The building, as shown, is of frame construction and of sturdy appearance.

MR. HOLBEN'S SHOP PRESENTS A VERY SUBSTANTIAL APPEARANCE

The interior views show a neat, well arranged shop. The shoeing wall is naturally plain except for the shoeing stocks. It will also be noticed that a small door between the first and second windows allows for the easy removal of sweepings, dirt and other refuse. On the rear wall on the shoeing side can be seen a stock of whiffletrees in orderly arrangement. Over the door leading to the wood-room is a case of plated shoes. The regular stock of shoes, it will be noted, is hung conveniently on the beams of the ceiling, and each size plainly marked with a neat, easily read card.

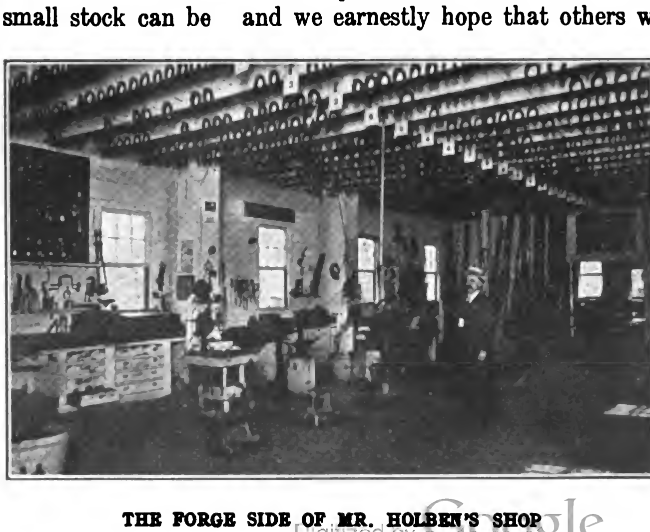
The other side of the shop, as can be seen, is equipped with three forges, each forge fitted with two blowers—one electric blower and one hand operated. Beside each forge is a tool-stand, for the various hammers, swages and tongs. The rear wall on the forge side contains the stock rack. Here the stock is very neatly and conveniently arranged, and easily accessible from the forges.

On this side Mr. Holben also has a desk next to the forge he himself uses. This desk is over a chest of drawers, in which he evidently keeps horseshoe pads and other stock. Directly over this chest of drawers is another case of shoes. It will also be noticed that a smaller tier of drawers is placed beside each of the other forges. Here small stock can be kept clean and free from dirt and soot and out of the way.

It will be noted in this connection that, besides using electricity to operate one set of blowers, Mr. Holben also uses it for lighting.

Electricity for smith-shop power and lighting is coming into more and more popular usage, and the smith having access to a power circuit may well equip his shop with the clean, powerful and ever-ready electrically-operated machines. Every reader can find a lesson in these pictures of Mr. Holben's shop, and we earnestly hope that others will

THE SHOEING SIDE OF THE SHOP



THE FORGE SIDE OF MR. HOLBEN'S SHOP

A GENERAL VIEW OF MR. HOLBEN'S MODERN SMITH SHOP

follow some of Mr. Holben's ideas on shop equipment.

Electricity in the Smith Shop.

J. N. PARKER.

Electricity has come to man's assistance in almost every industry, and it would indeed be strange were it not called upon to ease the labors of the smith. That it is doing good work for the blacksmith may be easily determined by looking into some of the shops, not only in the cities, but in rural districts as well. And the electric current is not only running the blacksmith's blower, but it is being used to operate his drill, his power hammer, his emery wheel and every other machine that can be operated by power.

The convenience of the electric current is beyond question—a twist of the wrist and your machine is running at full speed. There is no fire to start, no coal to shovel, no steam to get up, no crank to turn, no coaxing of a cold engine cylinder and piston into activity. A turning a switch, a whir as the motor starts, and your machines are ready for work.

The installation of the electric motor is also extremely simple. In the case of one large motor, used as power for the entire equipment of machines, the motor should be located at a convenient point, where it can be belted to the line shaft, and where it will also be free from flying dust, dirt and grit. The foundation should be solid and, while it is by no means necessary to spend the time, trouble, labor and material as for a gas-engine foundation, still the motor should run on a foundation that is strong enough to hold it solidly, and to keep it from vibrating unduly. If space permits, it is best to fix up an "engine" room for the motor. It isn't, of course, necessary to use a large space, but enough to allow one to get at all sides of the motor, with space for such supplies as oil, belting and such other power supplies as are needed from time to time.

In the case of individual motors for each machine, or group of machines, the motor should, of course, be placed as conveniently as possible. In the case of a blower direct connected with a motor, it is, of course, necessary to place the blower and its motor as near to the forge as possible. This insures the full power of the blower being delivered to the fire, and prevents undue loss of blast, which it is impossible to avoid where a long blast pipe is used and many turns made. The placing of at least one type of electric blower is simplified by reason of the independent switch and speed regulator, which allows for the blower being placed immediately behind or beside the forge, with a short, straight blast pipe leading directly to the fire. The switch and speed regulator can then be placed at the most convenient point for the operator. Then, too, the installation of this electric blower is further simplified by the universal motor, which can be connected to any current, either direct or alternating, of a given voltage.

As a means of lighting, electricity needs no introduction to smith-shop owners. The number of smiths who are already using electricity for lighting their shops is really surprising, and from the lighting stage to its use as power is but a step. It simply means the removal of a light bulb and the attaching of the motor feed wire.

An Illinois Electric Shop.

H. A. BINGHAM.

The accompanying engraving shows an interior view of my shop. As will be noticed, we use electricity, both for lighting and for operating a blower and a ventilating fan. For the drill, power hammer, emery stand and other machines we have gas engine power. Our prices are as follows: New shoes, per set $2.00; resetting, $1.00; bar shoes, per pair, $1.50; heavy studs shoes, per set, $4.00; resetting studs shoes, $2.50;

AN ILLINOIS SHOP USING ELECTRICITY FOR BOTH POWER AND LIGHT

rubber shoes, per pair, $2.50; leather pads, per pair, $ .50; hand-turned shoes, per set, $2.00 and up; Neverslips, per team, $7.00.

An Electric Power Shop.

F. E. POMEROY.

I started in business in this town in July, 1906, in a little boxed-up shop, and did all the work myself. As my business, however, increased, I kept getting more help, until I finally built this shop last spring. It is 30 by 60 feet and 2 stories high, with an office 10 by 12 feet. I do horseshoeing and general blacksmithing and, in fact, everything that comes to the shop. I manufactured twenty-five new pieces of work last year, ranging from an oil-field buck-wagon and delivery wagons to 1½-ton dray wagons, beside my regular work. I have just installed machinery in my shop. I run my drill with power, and have a 24-inch Crescent jointer, a 36-inch band saw, a circle saw and an emery stand. I have a 5-horsepower motor with which to run my machinery, and I employ from five to eight men all the time.

We have no association here and have but fair prices. We have a great deal of credit work which is, of course, a drawback. There is one man who won't stick with the rest of us when we try to get together. We have tried it twice and have failed. I am in favor of organization, and am also hoping the time will come when every horseshoer will have to pass an examination before being allowed to shoe a horse. That would cut out a number of shops the owners of which have to cut prices in order to get the work, and will give the real mechanic a fair chance. All we want is a fair profit and a good system, so that we can collect our bills.

The Divining Rod.

C. J. WINSTON.

Manager, The Goldfields Diamond Drilling Co., Ltd.

I noticed in your February issue the inquiry for a divining rod manufacturer and in your October issue see a very sensible reply to it from an experienced driller, and our experience is the same as the writer of the October article, namely: "Divining rod experts are no good."

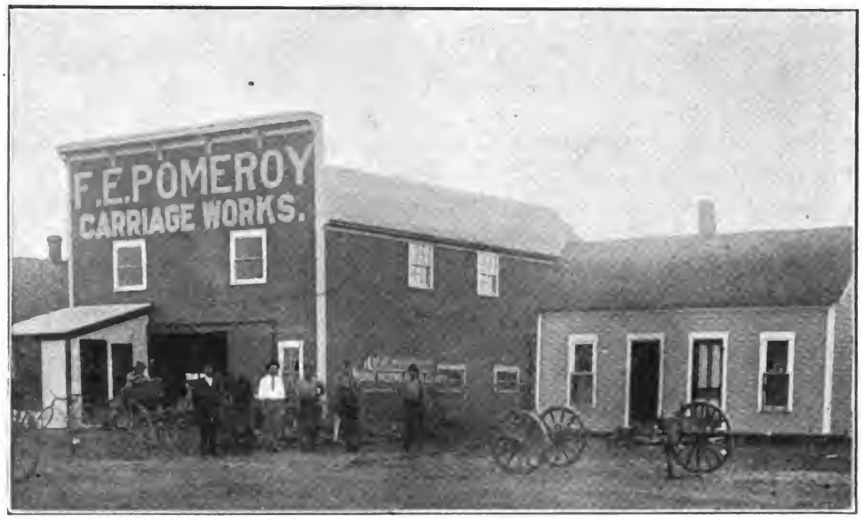
Had we not been afraid of being judged too fresh we would have answered the February inquiry by naming it "an invitation to be robbed, or a guardian needed." The writer would not so strongly condemn the divining rod if he could honestly see any value in the thing, and especially if the experience gained were only in Australia, but as it has been my good fortune to conduct drilling operations, not only all over Australia, Tasmania, New Zealand and South Africa, but also in Vancouver Island, Cape Breton Island, Canada and the many different States of the United States of America, it is fair to assume the condemning is not done by a novice.

One of the ABC points in the drilling business is to ask and know the why of things. Well, the longer we investigated, the less virtue could we prove in the divining rod. The writer has had the bark on a forked stick twist and crack while he was trying his hardest to keep the fork from dipping down. Believers in the rod would point gleefully to this twisting bark as undisputable evidence of the value of the rod. For a few days it had me bluffed, but the stubborn nature of always wanting to know why kept me making numerous tests, and it all boiled down to the fact that the tired muscles of one's forearm was the whole cause of the fork turning down in spite of the operator's honest efforts to prevent it.

We do an extensive business in drilling with diamond drills, and the water-boring branch is only a small part of our bread and butter supply. It would easily pay us to advocate divining rods, for, believe me, we are asked times enough to deceive people with it, but a firm doing business over so wide a territory as we are doing it cannot afford to be connected with anything but what they can honestly recommend. We certainly cannot recommend the divining rod in any of its disguises, but we do recommend the geologist, and that records of all holes be furnished the Government geologist, and the whole country plotted from information gained from every hole put down.

Splendid supplies of water have been proved to extend under thousands of square miles of country, not only in the country east of the Rockies, in the United States, but also here in Australia—hundreds of miles of apparent desert in which you cannot get a hole down five hundred feet and miss getting water. Any good geologist can trace these supplies, and if Government data is kept can give accurate depths at which water will be struck.

A good reply to the divining rod man is to turn him loose in a basin of this kind and have him locate where water *won't* be struck.



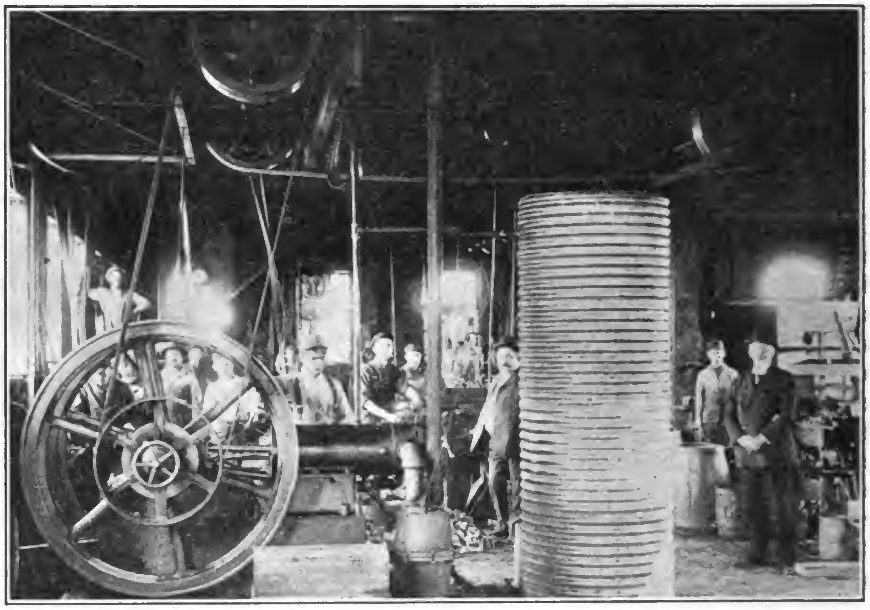
AN OKLAHOMA SHOP USING A FIVE-HORSEPOWER ELECTRIC MOTOR

Blacksmith Legislation.

ALBERT MEIER.

While visiting a brother smith several days ago our conversation turned to the subject of why smiths should have State laws for their protection. We discussed the lien law for horseshoers, and also the license law, whereby horseshoers would have to pay a license to practice horseshoeing after qualifying under a State board of examiners. To my way of thinking these things would be very good, if we had them at the present time. We must certainly realize the fact that we have all the legislative power we need right in our hands. If the smiths would only get together and use their own personal influence toward getting better trade conditions—this would be all that is necessary. My idea is this: If all the smiths throughout the country acquired the cash habit, instead

of constantly giving credit, and from parties who have an established credit collect account in full each month, (no extension of credit over 30 days) and to local trade no credit, but cash for each job—if these rules were established and followed, the craft would get better satisfaction out of their work. This is all the legislature blacksmiths need: Courage and Common Sense, and for their pass word "Cash"—get the habit.



THE INTERNATIONAL ENGINE IN CAMP BROTHERS' ILLINOIS SHOP

Power in the Blacksmith Shop.

THOS. F. WILLOUGHBY.

I. H. C. Service Bureau.

The chug-chug of the gasoline engine has become a familiar sound in the blacksmith and repair shop. These safe, simple and economical engines furnish ideal power for the small shop where an expensive steam engine would be impractical. They are also finding favor in larger shops that may well be classed as factories.

The progressive smith now realizes that a large part of his work can be done better and more economically with machines operated by mechanical power. Besides a well equipped shop attracts trade—it gives out the impression that the shop is fitted to take care of the most difficult jobs in an expedient manner—and it is.

The shop equipment which once consisted of little more than a forge, anvil and a collection of hammers now has been enlarged to include lathes, combination wood workers, band and circular saws, bolt threaders, big welding hammers, power blowers and many other modern, labor-saving machines, which will turn out work with the least loss of time. They enable the smith to do work in a few hours which, before their advent, required days.

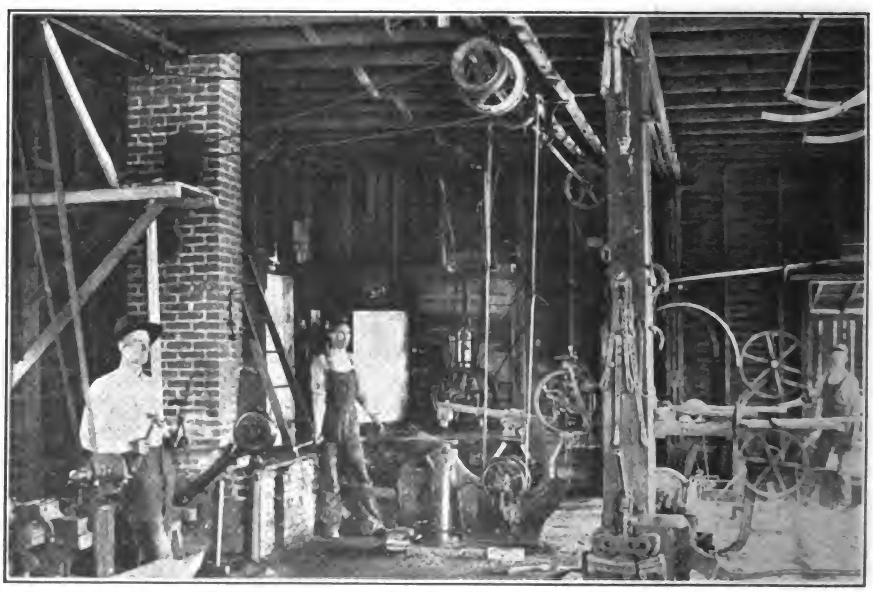
These machines, without which no shop is complete and up to date, require a simple, inexpensive power. The gasoline engine meets this requirement and is within the means of every smith.

One of the great advantages of the gasoline engine is that it furnishes an intermittent power which can be started and stopped without loss of time. Turn on the fuel, close the switch, give the wheel a turn, and in sixty seconds the engine is giving maximum power.

In many shops these engines are seen belted to line shafting, which transmits power to every part of the shop. The "village smith" no longer stands before his forge pumping a huge bellows and mopping the perspiration from his brow, but, instead, he shifts the rapidly moving belt from the idler onto the pulley, and a power blower sends the sparks flying. Another belt is shifted and a big power hammer begins its work. So on throughout the shop, the heaviest and hardest work is done by machines, and the smith is becoming more and more a man who works with his head.

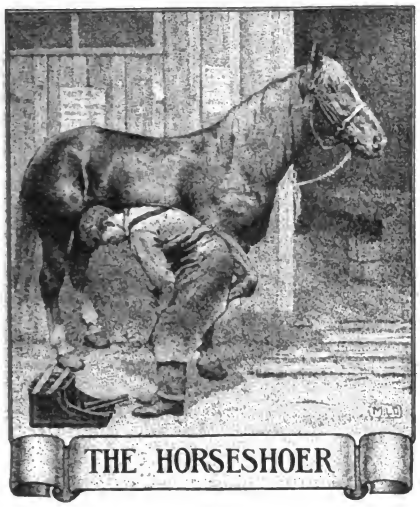
In selecting a gasoline engine for the shop a few simple truths should be borne in mind. First, be sure to select an engine of sufficient horsepower to do the work. An overloaded engine will soon wear itself out and consume an excessive amount of fuel. Second, remember that it pays to invest in quality. No one knows better the value of good material and good workmanship than the smith, and that knowledge should prevent him from being misled by the first cost. A reliable engine of standard make should always be selected. It will pay in the long run. Third, look out for fuel economy. There is a great difference in the fuel consumption of engines, and too much stress cannot be laid on the importance of selecting an engine that will consume a minimum amount. Fourth, the simplicity of an engine will contribute largely to the satisfaction it gives. Avoid complicated forms of construction, as they always indicate weakness, lack of durability and a marked tendency to get out of commission.

After the engine has been installed, study it—keep eyes and ears open, and it will prove the best investment in shop equipment ever made. Don't be afraid to learn all you can about your engine. Observe its workings closely. Know it from end to end. Go over it



MR. G. G. JENKINS, OF ILLINOIS, USES AN INTERNATIONAL ENGINE TO DRIVE HIS MACHINES

at regular intervals—cleaning, adjusting and examining it carefully. When a part needs adjusting do it immediately. Do this and you'll find the engine your best shop friend and helper.



The Principal Cause of Interfering.

PAUL V. BURGESS.

If every horse was perfect in his limbs and traveled in a straight line we would have but very little interfering to contend with. There are some things, though, that will make a horse strike that is almost perfect in build. One case of this kind I recall to mind. A farmer had a very fine young driving horse, and he brought him to me and complained that he was cutting his ankles. I told him to bring him in and I would try and see if I could find the cause. Of course, I expected to find some deformity in his limbs, but when I got him on the floor and lined him up I was surprised to find him almost perfect in build. I examined his feet and found that he was correctly shod with the clinches down close and smooth. I was somewhat disconcerted for a time, for I could find no cause for him to strike. We then took him out in the street and led him up and down at a sharp trot, and he went clear, in fact, he gave no sign of hitting. By this time I was firmly convinced that it was some fault other than his own that was to blame, so I asked the owner to hitch him to the buggy and we would drive him and try to find out the cause. He did so, and we had not gone far until, going down a slant, with the buggy crowding him, he struck and commenced limping. We stopped at once, for I had discovered the cause. The breeching of the harness was about six inches too low, and the straps to the shaft were too short. They were the cause of the horse striking. So we raised the breeching well up on the horse and also lengthened the side straps, and the interfering stopped at once.

Another case I remember, similar to this one: A trainer was breaking a two-year-old colt. The animal kept striking one of his back ankles pretty badly. I tried two or three different kinds of shoes, but the cutting continued. I finally concluded to look somewhere else for the trouble. I asked the trainer to let me drive him a while, and I had not been driving fifteen minutes when I discovered his fault. He trotted sideways in the cart—"Dog Trotting" we call it, and, consequently, it made him strike his ankle. You will never find this fault in seasoned roadsters, but it is a habit quite common in colts. In this case I explained his fault to the trainer, and he put a boot on the injured ankle and continued driving him, and he soon righted himself in his gait and today is one of the finest and speediest roadsters in this section and never cuts himself.

But these cases just mentioned are rare, and you will not find them often. As I said in the beginning, defective conformation is the main cause, and to be a successful shoer one must study the anatomy of the horse and be able to detect any deficiency in his limbs or feet. A simple way, yet a very correct one, is to draw a heavy chalk mark on the shoeing floor, and stand the horse over it, with the line exactly between both the front and hind feet. Then, by stooping down in front of the horse, you may easily detect any crookedness of the legs, if there be any. If the feet are too wide, with the heels close together, he is almost sure to strike, unless the limbs set wide apart. If the toes stand in, he will travel wide and go clear. Another good way is to take the foot up and, holding it loosely, pass the leg back and forth in as near a natural way as possible. Often this will show you how he strikes. The most universal way of shoeing for interfering is to leave the foot high on the inside and lower it on the outside, the object being to make him break over on the outside of the toe, and thus go clear. Where the foot is too short to admit of much paring, you can get the desired result by welding a small toe near the first nail hole on the inside of the shoe; also turn a low heel on the inside, but leave the outside smooth. This will often give the desired result. I often use an inside weight with good results. If I don't happen to have any in stock, I take a light and heavy shoe and cut them in the center of the toe and weld them. This makes a good side weight shoe.

But, after all, I find some horses that no method that I can employ will stop entirely. I sometimes think that if some drivers would use a little more judgment in caring for their horses, feed them better, groom them properly, and use some sense while driving them—and not put in so much of their time finding fault with the shoer—perhaps we would not have so much to contend with.

When to Train Colts.

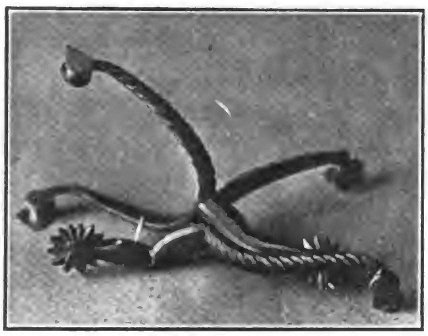
PROF. JESSE BEERY.

Colt training on the average farm does not occupy a very prominent place in the list of duties to be performed. It is too often a rainy day job, or left for the boys to do, or placed in the line of duties for incompetent hired help. There are many who think it best to begin the training of a colt when it is a few days old, and gradually train it so it will be well broken when it arrives at the age of usefulness. Colt training is of too much importance to allow it to

THE GENERAL SHOP OF MR. J. R. PATTERSON, OF KENTUCKY

take a subordinate place in the work about the farm.

There is scarcely a day passes without using a horse in some way. The work may be made very unpleasant day after day, year in and year out, because of some unpleasant habit of the horse. When one hitches the horse to a new buggy, or to a piece of machinery that has probably cost more than a hundred dollars, the risk of losing that buggy or piece of machinery depends upon the trustworthiness of the horse. It would surprise many farmers and teamsters if they had an accurate account of the amount spent annually for repairs of breaks caused by horses. There is not only this great loss in wear and breakage of machinery and buggies, but the real danger to human life. It is not an extravagant statement to say that nine tenths of all the accidents and trouble caused by bad horses can be traced back to improper colt training. Most of the



HAND-FORGED SPURS ARE HIGHLY PRIZED BY STOCK MEN

bad habits that apparently develop later in a horse's life are the result of either the lack of colt training or the wrong kind of training. Since the pleasantness of many years' work, the possible loss of many dollars' worth of machinery and the safety of human lives depends upon proper colt training, it ought to have a more important place in the order of work than simply a rainy day job. There ought to be some one more responsible than a reckless bunch of boys, or an indifferent farm hand.

There are many things to consider when one speaks of training a colt from the time it is a few days old. It seems foolish to me to tinker along two or three years to train a colt what can be more easily and better taught in less than six hours when the colt is more mature. The soft, pliable tissue of a young colt's brain is too soft to retain a lesson any length of time, and must necessarily be repeated after a time, The probabilities are that the lesson will not be repeated just exactly as first given, and more or less confusion results. Maybe several different people will have a hand in the training when it extends over so much time and this always results in confusion to the colt.

One good impression fixed upon the brain of the colt from eighteen months to three years old, stays for the remainder of its life.

No effective training can be done without the colt's undivided attention. A small colt cannot fix its attention to any one thing for any length of time. The length of time that a mature colt's attention can be kept is not long—a half hour at most. Whenever any teaching is attempted without attention, that teaching is useless. The wise teacher only attempts to hold the attention of her boys and girls a few minutes at most.

The attention of an adult audience can be kept only by an exceptionally good speaker for more than an hour at a time.

The attention of a dumb animal cannot possibly be kept for the length of time that an ordinary adult human being can.

Attention depends upon interest, and a lower animal has but very few points of interest.

If a man wishes to keep the attention of a colt and get results, he, too, must put his attention to the work, and keep his mind working with the colt. Much energy is lost both to the man and colt when colt training is a secondary matter to some business to be transacted at the end of the drive. It is business enough to train the colt.

When a colt is taken too young to train, the tendency is to occupy too much time, lose the attention of the colt and allow it to pick up habits that are very undesirable. After a colt's attention is lost and a lesson is continued, it becomes an annoyance to the colt, and may cause it to retaliate by kicking or biting, or in some way that lays the foundation of a bad habit.

Taking everything into consideration there is little gained and much to lose by attempting to train a colt before it begins to show the form and qualities of a mature horse.

There may be occasions where it will be necessary to train a colt to do a few things at an early age. It may be necessary to teach it to stand tied or to lead with a strap. If it is absolutely necessary, of course there is nothing else to do. For myself, I would prefer that the colt run loose rather than get the habit of chewing straps, slipping halters and other habits that come as a result of long days of idleness and mischief.

When he becomes old enough for actual use, fifteen minutes is long enough to teach him to stand tied so that never after will he pull on a strap. Another thirty minutes, or less, will teach him to lead so that he will lead obediently, without the prancing and crowding and other pranks that the early broken colt usually indulges in.

A Pair of Hand-Forged Spurs.

LLOYD GERMAN.

The accompanying engraving shows a pair of spurs of my own make which, when nickel-plated and mounted with silver slippers, buttons and name-plate on outside, with strands, each one alternately brass or copper colored, will make a piece of work which would be highly prized by stockmen and riders in general. Hand-made spurs and bridle-bits are extensively used throughout the cattle ranges of Texas and the Southwest. They bring anywhere from $2.50 and upward; the $5.00 or $7.50 being the most popularly used, although I have seen several $25.00 pairs, and there are some jeweled, costing $50.00 and $75.00. Saddles bring upwards to $500.00.

An Easily Made Emery Grinder.

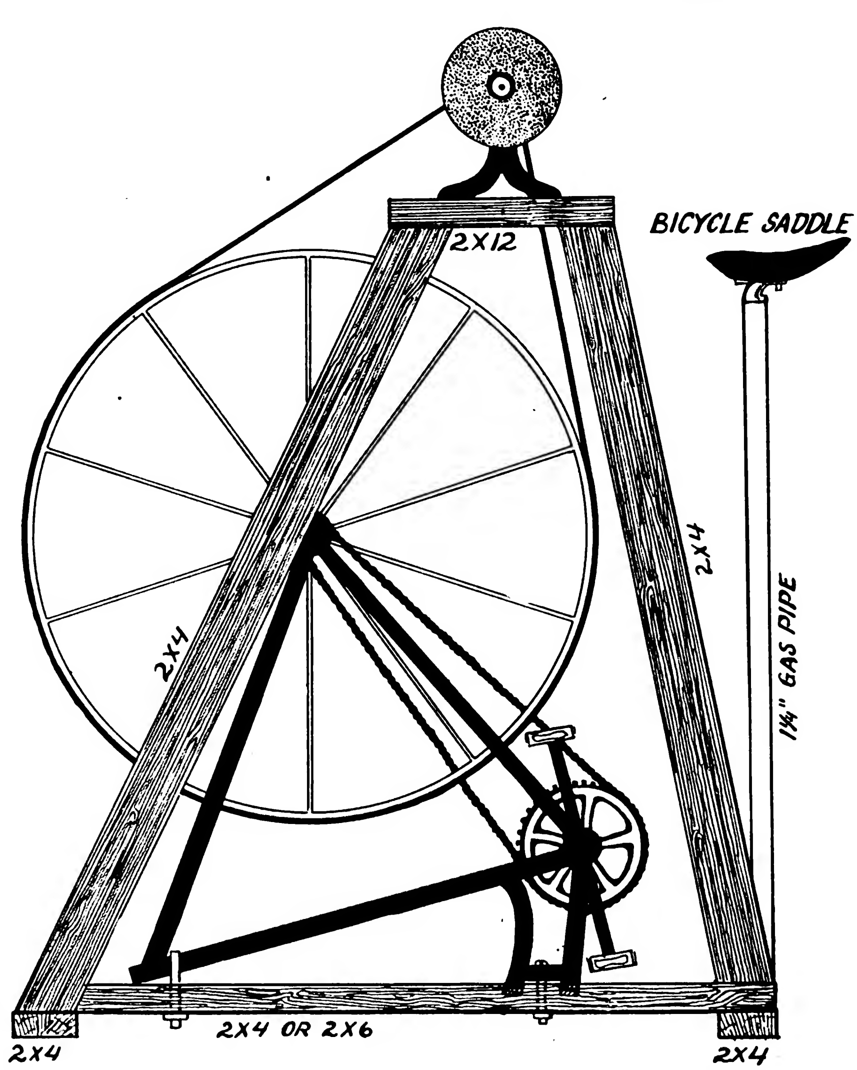
J. D. HOPPER.

A very efficient and cheaply constructed emery grinder is made as follows:

Take an old bicycle (drop frame preferred) and saw off top bar just in front of seat post. Saw lower braces about eight inches in front of hanger. Place it in a wooden frame and fasten as shown in the engraving. Take the rear hub and babbitt it or otherwise fasten it in the hub of an old cultivator, or similar wheel. This wheel must, of course,

have a flat face for the belt. A wheel 30 inches in diameter can be used in most cycle frames. This wheel serves both as pulley and flywheel. The cycle should be geared about 66 to 70 to get proper speed for 6-inch emery wheel. Place the wheel in the frame same as cycle wheel and use original pedals, cranks, hanger and chain.

The emery stand may be bought or made from pipe fittings as previously described. By studying the engraving it can be easily seen how to complete this machine, which will prove to be more efficient than any factory made machine on the market. I have used mine continuously for four years, and it has never been out of order.

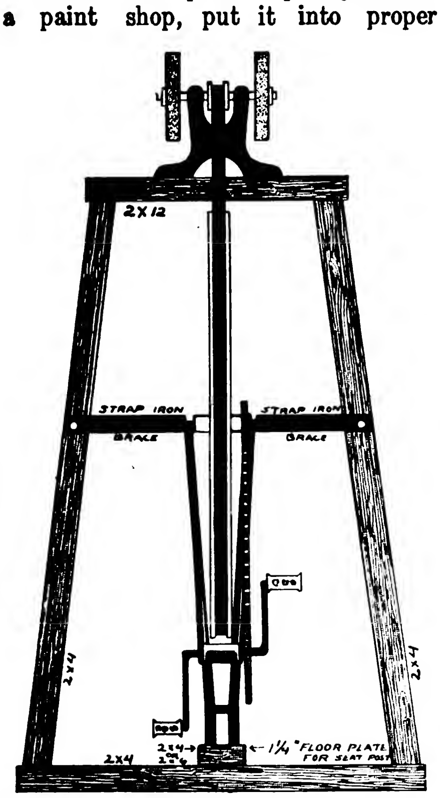


A SIDE VIEW OF AN EASILY MADE GRINDING TOOL

Repainting Vehicles in Horseshoeing and General Repair Shops—2.

W. A. RIGGLEMAN.

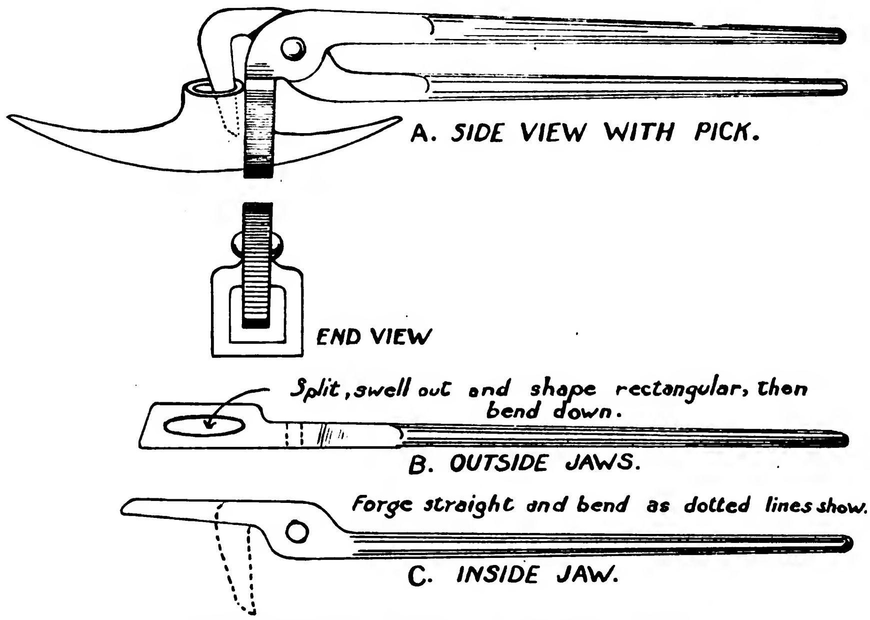
One trouble with the usual shop is that it is never built big enough. All you think about when you build is the blacksmith part of it; you think you can paint a vehicle any old place, which is a very mistaken idea. If your paint shop is above the smith shop, your floor should be double and well closed around the edges and chimneys. Care should be taken that the windows are tight and sound so that no smoke or dirt can come through. There should be plenty of light in the rooms and a good big runway outside for use in getting the work in and out of the paint shop. If you have a paint shop, put it into proper condition before trying to paint anything in it. This is the time of the year to look after the paint shop, as the season for repainting will soon be here again. After things have been put into proper condition, get a good painter to do your painting by the day, or give him half of the proceeds, or sixty cents on the dollar, especially if you do not do much repainting, so your painter can make something out of the work for the short time he is at it. You make a great deal of money on the other repairs needed. Most repaint jobs need other repairs.



THE EMERY GRINDER FROM THE FRONT

A good plan for running your paint shop is to have four ways in which to do repainting. By doing this you are bound to catch your customer. (Be sure to show this article to your painter, as they usually do their work in the same old way, never trying a new method.) You might name the four different kinds of jobs thus: The revarnish job, the color varnish, the medium, and the first-class job. In this way you can have four different prices for light and heavy jobs. You must not paint them all alike; have some system about your work and different ways in which to repaint. Some painters just keep to the old time method, which is one of the reasons paint shops do not pay. If your painter does not know how to reform his method of doing business, show him how to do it in writing. If he cannot read, read it for him in my next article, in which I will explain the four different methods of repainting, and prices as well. Of course, prices vary in different parts of the country, so you can either raise or lower the prices I give you. You will, of course, know about how prices are in your part of the country, but should aim to get as high as you can for repainting. One thing that has lowered the price of repainting is that we will cut down the price of repainting in order to get the other repair work to be done on the vehicle. We forget about the poor carriage painter and how he is to eke a living from his trade.

There is also another thing: the blacksmith or woodworker will attempt to repaint, though it might more properly



PICKS ARE EASILY HANDLED WITH THESE TONGS

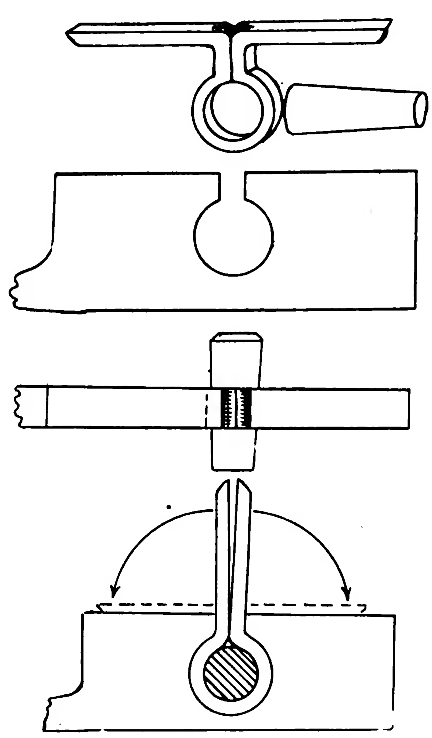
be called daubing. He should not do this, but should send the work to a carriage painter if he has none employed. Send the jobs to a painter who is running his own paint shop. All shops that have no painter should send the work to such painters. If a painter takes in a job that needs other repairs he might ask the customer where he prefers having the other repairs looked after. More than likely the customer will tell him to take it where he thinks best. In this way the painter is helping the blacksmith, and the painter himself could make a living in a small town in which there are three or four blacksmith shops, though not enough work for each shop to employ a painter, and he could work up the prices on repairs gradually.

Tongs for Handling Picks and a Tool for Making Pipe Hangers.

BERT HILLYER.

In piecing picks with steel, when they have become too short and are worn down, a common pair of tongs will not hold them steady and will slip back from the taper on the pick while it is being hammered. A pair made like those in the engraving will give satisfaction, as it will hold the pick firmly and securely no matter how much hammering is done on the pick. The lower part of the tongs in the jaw part are first made in a ring which will be large enough when closed together to form a rectangular shape through which the end of the pick will pass all the way up to the eye. This is bent down at right angles and the other part is forged as in an ordinary pair of tongs after which it is bent down to go inside of the eye of the pick. The smith who has much of this kind of work to do I am sure will be well pleased with a pair of these tongs.

Pipe hangers are sometimes made in large quantities, and it surely pays to make tools so the hangers can be made accurately and quickly in quantities. One style of hanger and the tools with which to make it are shown in the engraving. This is for a small pipe and is slipped on before putting on the coupling. The pieces are cut of the proper length and bent in the middle in the shape of a rough eye which will go into the tool. The pin is then driven in which trues up the eye and holds it secure while the ends are bent down as shown by dotted lines in D.

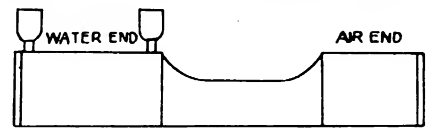


A TOOL FOR FORMING PIPE HANGERS QUICKLY

Troubles With Mine Pumps.

L. R. SWARTZ.

It is a long lane between questions relating to the behavior of steel under the treatment to which it is subjected in jar heads and the action of air in the cylinders of mine pumps under a back pressure of 50 or 60 pounds per square inch. Nevertheless, the observer of physical phenomena cannot always choose his subject, nor can he always demonstrate it satisfactorily when called to do so; but since a number of our craft are now filling the positions of mine smiths, which require some of the primary principles of hydrostatics and hydraulics, I will try to describe a remedy for the improvement of the action of mine pumps, and this especially applies



TROUBLES WITH MINE PUMPS

to the treatment of Cameron and all other steam pumps having their valve boxes on the side and the partition between upper and lower valves not above the upper edge of the plunger cylinder in the water end of the pump. The Knowles and some other makes of mine pumps are not so much subjected to the disease of "Air priming" as are the Cameron; because they have their valve chambers directly above the cylinders. Outside of this difficulty there is no more satisfactory water end made than that of the Cameron pumps. And the trouble to be remedied is caused in nine out of ten cases by defective suction pipes rather than any defect of the pump proper. However, since it occurs, it is small matter to us where it originates. The main business is to remedy the defect, as time is seldom at our disposal to experiment. Oftentimes it is impossible to repair or replace a suction line on account of the abundance of water. In such cases the disease may be detected by the diminished flow from discharge, from ½ to 2 or 3 hours after starting the pump with proper priming. A common remedy is to have a valve (say 2 inches) at the connection of pump with discharge pipe. When this valve is opened to its fullest extent it reduces the back pressure on cylinder and valve box and allows the pump to prime solid with water. One may detect the pressure of air in cylinder by the pump cutting off unevenly in the steam end.

This article has special reference to pumps driven by compressed air, because it can there be easily detected by the sound of the exhaust. In such cases the quick and sure remedy is to tap and fit the cylinder with small pop valves, such as those on automobile tire valves, but reversed, surmounted by a cup to insure solid closure of the pop valve to prevent the admission of air into the cylinder, but in nowise to prevent the escape of air from it. The whole plan will be found fully explained in the accompanying sketch, and may be of benefit to a fellow craftsman who has to care for mine pumps along with smithing.

In mines of any age sound suction and discharge pipes are a rarity. Owing to the elasticity of the air once admitted to the pump cylinders it will compress on the home stroke and expand on the back stroke, and thus prevent the handling of a solid stream of water by the pump, whereas by means of the back pressure of the discharge column being greater than the suction lift the air is expelled by the home stroke of the plunger, and the cylinder is solidly primed at each stroke. The loss of water is very small in comparison with the loss of the discharge on account of the air in the cylinder. In most cases a 1/16 to 1/8-inch hole in the pop valve connection is sufficient, or small nipples may be substituted for valves, to which a hose of small diameter may be attached. The hose must be of small diameter and have the free end submerged in water.

How to Forge Shackles.

BERT HILLYER.

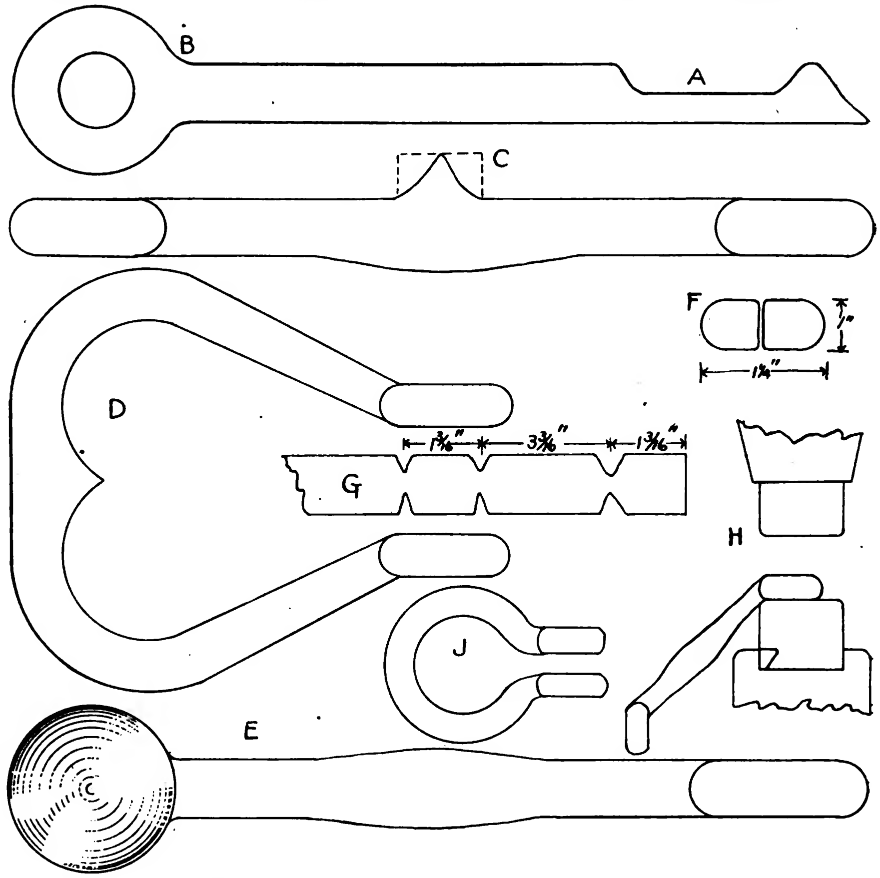
In describing the forging of any kind of implement it seems to me necessary to describe the two methods of forging; that is, with the steam hammer and without the steam hammer. Each of these methods requires a different process, and the reader who has never worked under a steam hammer is confused if the forging is explained according to the steam-hammer process and wonders why the article is made from a solid (if he had to make it, it would be made in pieces and then welded together), while the smith who has always worked with a steam hammer is correspondingly confused if the method described does not require the use of the steam hammer, and he wonders why the other smith makes so many welds to do the same job for which he would use a solid piece. I know from my experience that it requires more skill to forge a piece of work on the anvil than it does under the steam hammer, but as the average strength of welds is 95% it proves that a job made from the solid is superior to one welded, but as all of us do not have steam hammers, some are compelled to depend upon welding.

I shall first describe how to make a shackle without a steam hammer. Cut a piece of round iron 17 times the diameter of the iron from which the shackle is to be made. For example, if it were made from 1-inch iron it would take 17 inches; if made from ½-inch iron it would require 8½ inches. This allows for both ends to be bent around and welded, and will make a shackle in proportion. To begin, heat end of piece, cut off the right length and lay it in the bottom swedge. Take a round edge set hammer and flatten top part, as at A. If this shackle is made from 1-inch round iron, with a 1-inch hole in the end, the place flattened down should be ⅝ inch by 5⅛ inches long. The end is then bent round and welded, as shown at B. The shackle should be larger in the middle and taper down to the neck.

To make a double shackle or heart shackle, forge the same as above, simply making it one half again as long, and upset well in the middle. Then use a chisel, driving it partly through the iron lengthwise. Drive a wedge-shaped piece in, as per the dotted lines at C, and then weld up wedge with a good heat, using a necking fuller on each side of it so that the point in the middle is left high; finally, bend, as at D. These shackles are used for two guy lines, or sometimes one side is used for the load and the other for a guy line.

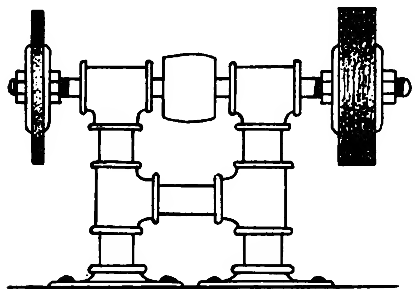
I will now show how much easier they are made with a steam hammer and in an altogether different way. We make them out of one solid piece. In the first place a ball swedge is necessary. This is made from a pair of blank spring swedges. Then make a ball on the end of a piece of 1-inch round iron, making it just as round and smooth as possible. Heat up the blank swedge and place ball in between; drive the blanks together and keep turning the ball with every blow of the hammer; also keep the impression of the ball as free from scales as possible. You will never be without this tool when once used. It will make heads for shackles, eye bolts, wrenches, etc., and when flattened down thin the ball can be turned into a ladle with a solid stem.

To make a shackle from the solid, take 10 times the diameter of the iron from which the shackle is to be made. When finished this gives the length between the balls, that is, when drawn out to size.



SHACKLES ARE EASILY MADE WHEN YOU KNOW HOW

In the first place find out how many cubic inches there are in the piece between the balls. If this were 1 inch round, square the diameter and multiply by .7854. Then multiply by the length



FOR THE ELECTROPLATER

in inches, which is 10 inches. Example: 1 x 1 x .7854 x 10=7.8540, or very near $7\frac{7}{8}$ cubic inches. Next, we want to find how many cubic inches are in the finished eye, which has a 1-inch hole in it. Outside, the eye measures $2\frac{1}{4}$ inches by 1 inch thick, so the metal around the hole must be $\frac{5}{8}$ inch. In order, therefore, to find out how much stock we have we multiply $1\frac{5}{8}$ by $3\frac{1}{7}$, which equals $5\frac{8}{28}$. It takes $5\frac{1}{16}$ inches to make the eye. If this eye were cut in two even pieces and laid together we would have a piece as at F, to get the area of which add $1\frac{1}{4}$ and divide by 2. 1 plus $1\frac{1}{4}$ divided by 2 equals $1\frac{1}{8}$ inches—giving us a piece of $1\frac{1}{8}$ inches round, $2\frac{17}{32}$ inches long, in which there is a little over $2\frac{1}{2}$ cubic inches. In order to find how much is in the ball we cube the diameter and multiply by .5236. Example: $1\frac{3}{4}$ x $1\frac{3}{4}$ x $1\frac{3}{4}$ x .5236=2.8061 cubic inches. As you will see, we have a little more in the ball than in the finished eye, but this must be allowed for waste in punching hole. To find out how much $1\frac{3}{4}$-inch round iron it takes to draw out a piece of 1-inch round take $1\frac{3}{4}$ x $1\frac{3}{4}$ x .7854=2.4052; 7.8540 divided by 2.4052 equals $3\frac{6384}{24052}$. This allows for small amount of waste that frees itself at end of ball. If, when punching the hole in the eye, the hole gets out of center, cool the thin part, leaving heavy part red hot, and drive in the punch. It will then stretch in hot part and draw hole to center. When flattening down ball, hold it on on an angle, as shown at H. This flattens the end and at the same time gives the piece the correct angle.

How To Do Electroplating.

A READER.

Preparing the Work for the Plate

The main thing to do in preparing work for putting on the plate is to have the article perfectly clean and free from grease. In preparing the work the first thing to do is to polish it. This may be done by hand, but the better way is by means of polishing wheels. If you have a small grinder head you will also need several polishing wheels. These are made from emery, leather, canvas and muslin. These wheels can be procured from any platers' supply house or you can make them. The wheels should be of a fine grade and are used for grinding off any imperfections in the metal, also if there is a very heavy coat of rust they may be used to grind off the heaviest part of it. The leather wheels are made of a good quality of sole leather; about three or four thicknesses of this leather being required to make a good wheel. The muslin and canvas buff wheels are made of sheets of muslin or canvas cut out and then sewed or quilted together till the desired thickness is procured. You can purchase a small polishing head from any jobber in blacksmith supplies for about a dollar. In case you do not use power I would advise your getting hold of an old sewing machine frame and putting the head onto this, thereby giving you a foot-power polisher, and leaving both hands free to work with.

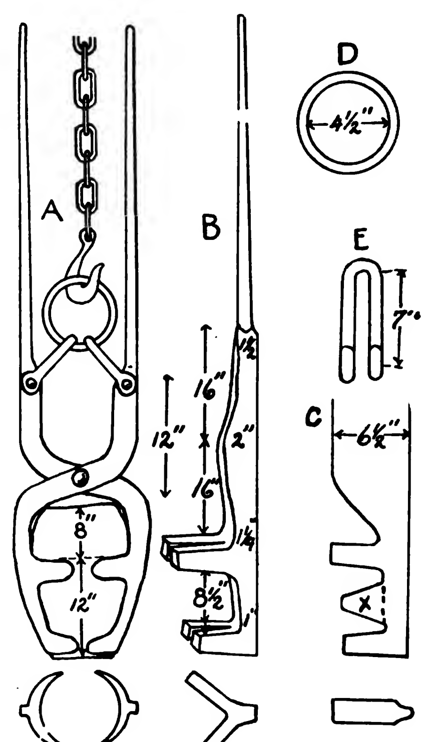
A good little polishing head may also be made from old pipe fittings. I think I got this idea from THE AMERICAN BLACKSMITH, but am not certain, but at all events it makes a nice little head and will do the work in a satisfactory manner. Here is the way mine is made:

Take four T fittings, four close nipples, one nipple a little longer than the width of the drive wheel, and two flanges. The illustration will show how they are put together. Sal ammoniac should be placed on each thread in order to rust them together. This is the way all my polishing heads are made. I used three-quarter inch fittings, and babbitted the two top Ts in which the mandrel or shaft runs. I made a polishing head for each set of wheels, having one for the two little emery wheels, one for the leather and one each for the canvas and muslin wheels. This saves changing wheels so often.

This practically completes the polishing outfit, with the exception of some powdered emery, crocus, rouge, tripoli—these being used in connection with the polishing wheels. As all blacksmiths are familiar with grinding and polishing there is no use in taking up space with directions on this point.

When an article is brought in to be plated, the first thing to do is to polish it up until every bit of rust, paint, old plate or any other corrosion is entirely removed. Any little particle of rust or paint will, sooner or later, scale off and, of course, will bring the plate off with it. When the article has been polished until all loose scale of every kind is removed, and all the parts are perfectly bright, there is likely to still remain a small amount of grease or dirt from the wheels or from the operator's hands which will prevent the plate from sticking. This must be removed by dipping the article in what is known as the dipping bath.

This bath is made by dissolving a pound of caustic potash in a gallon of water. This solution should be used hot, and it is a good idea to put it in a metal pan or tank and keep it boiling while using. The article to be dipped should be hung on a wire and dipped in this solution and shaken around a bit until you are ready to start plating. It should then be removed from the dipping bath by means of the wire and rinsed in clean cold water, after which it is ready to plate. Never touch the article with the hands after it has been taken from the dipping bath, for no matter how clean your hands may appear there is always grease or other matter upon them which will prevent



HOW TO FORGE CRUCIBLE TONGS

your getting a good, even and smooth plate. If you were to press your thumb on an article and then place the article in the plating bath you would find an exact reproduction of the thumb print on the plate, so it pays to be careful and

to always handle the work with a clean wire. Also, never take the polished article out of the dipping bath until you are ready to rinse it and put it at once in the plating solution. If you do, there will soon form a thin coat of rust which, although you cannot see it with your eye, will cause a poor plate.

I think I have fully explained the preparation of the work for plating. Of course, it will take a little practice, but in the end you will find plating an exceedingly simple operation, the main thing being the exercise of great care. I suppose you have your tanks ready, and now you will get the polishing outfits ready.

As copper is the cheapest metal to use and is also about the easiest to handle we will take up plating with copper first. In this way you will get practice in handling the outfit and in plating, and it will not matter if you do spoil a little work as it costs practically nothing to plate with copper. If you have any trouble in getting any of the necessary articles I can tell you where to get them, if you write to me, though, of course, I should like to have you send a stamp. It looks like a small thing, but if a thousand or two were to write me, as was the case with the nickel silver outfits, it makes it quite an expensive proposition. Also, do not get discouraged if you do not hear from me immediately, as I have to work all day, but will answer all letters as soon as I possibly can.

In the next issue we will take up plating with copper.

Making Crucible Tongs.

BERT HILLYER.

A brother smith from Ohio requests an explanation of the different steps in making crucible tongs. These tongs are made in various styles. One of them was shown in last September's Journal. Another style which will lift a 15 by 20 pot is shown in the engraving. This is for a crucible which is 15 inches outside diameter, 12 inches from the bottom and 20 inches high. The jaws of these tongs are made strong to withstand the strain of the heavy weight in lifting crucible from the furnace. The jaws taper from 1 inch by 1¾ inches at top to ¾ inch by 1 inch at bottom, and are bent on the edge in a rib shape with four wings which are drawn down, tapering from ⅝ inch by 1⅝ inches to ⅛ by 1½ with a fillet in all corners.

The size stock used to make tongs is 1⅜ inches by 5½ inches soft steel. This is fullered in as shown at C. This should be done with a narrow fuller to keep from dragging down the metal and thereby reducing the size. The piece in the center at X can be cut out as dotted lines indicate, enough being left to true up and make 8½ inches between wings. The handle is drawn out as shown at B, it being best to do this first so as to have a handle when forging the jaw. The part for the wings is split with a hot chisel down to the rib, and then spread out, so that the wings can be drawn out by rolling with a piece of round iron under steam hammer, after which it may be smoothed and fitted to the shape of the pot. When bending the handle put one side of the mark in a fork and run a piece of heavy pipe down the handle near the mark on the other side. By shifting this pipe up or away from mark a short or long radius can be bent. The pipe should be just a comfortable fit.

The shackles and ring that close the laws hardly need be described, it only being necessary to remark that the shackles are riveted on and work freely. The length of handles are made to suit depth of furnace. When tongs are assembled it should be observed that the rib and wings fit snugly all around the pot. The engravings, I think, will explain themselves. These tongs can be made with six wings by splitting the middle piece at X.

"What's new today, Mr. Editor?" asked Benton, as he seated himself beside the "forge."

"Nothing, Benton, unless you have it to offer," returned the Editor, swinging about in his chair. "What have you been doing with yourself these past two weeks?"

"I've just been down in the country, but the weather didn't suit me, so I came back home," and Benton helped himself to a cigar and made himself comfortable.

"Did you call —" but Joe Evarts came in at this point.

"Just the man I want to see," said the newcomer to Benton. "I'm in trouble, and I think you can help me out, Benton."

A THRESHING SCENE

"Glad to do so, if I can, Joe," returned Benton. "What are you up against this time?"

Joe Evarts, it must be explained, is a young smith and is employed by a medium-sized manufacturing plant. He is called upon to do most all kinds of work, from the forging of a bolt to the tempering of lathe tools, and he occasionally calls upon Benton for help.

"I'm having trouble with steel scaling when hardened," said Evarts in reply to Benton's query. "There must be something I can use on polished steel so I can harden it without raising or forming a scale and spoiling the polish. You see, they use a number of rollers that need hardening and, every time they're hardened, the scaling, of course, spoils the polish. I've tried using borax to prevent a scale, but, as you know, it's pretty difficult to remove. Now, haven't you something you can offer?"

"I think I have something that will just suit your case," replied Benton, turning the leaves of his notebook. "Here we have it, now: Take equal parts of common fine cornmeal and common salt and mix the two thoroughly. Keep a small box of this mixture near your fire. When ready to harden your roll, dip it first in clean water and then into the salt and cornmeal mixture. Now place the roll carefully in the fire and heat until the mixture begins to melt. Then remove from the fire, dip again in the mixture, covering every part well, and reheat to the required temperature for hardening. Care must be exercised in placing the piece in the fire, and also when any part of the work appears bare, sprinkle some of the mixture on it."

"Does the mixture have any effect on the work other than to keep the surface from scaling?" asked Evarts.

"No," replied Benton. "The salt and cornmeal when heated form a flux on the surface of the work and prevent oxidation by excluding the air from the heated surface. You see, this mixture acts exactly the same as borax does when used in welding, but, as the mixture is easily removed, it is, of course, better than borax."

"How is it removed?" questioned Evarts.

"It comes away easily when the work is cooled," replied Benton. "There is little or no difficulty in removing it, and it leaves the surface of the work clean and polished as before heating."

"Well, Benton, I don't know how to thank you for that tip. About all I can say is to ask you to call on me whenever I can be of any service. I'm several hundred times obliged to you," and, with a nod to the Editor, Evarts went over to the factory.

The Blacksmith's Primer.

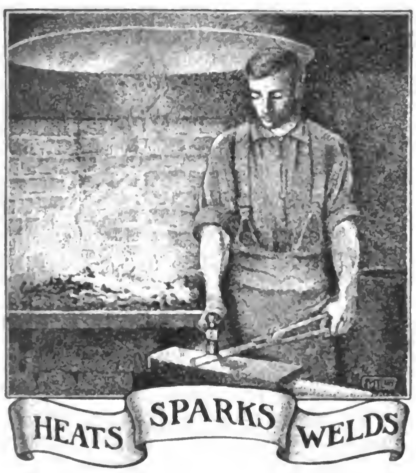
W. O. B.

When you get a job of shoeing,
Of resetting or renewing,
And you're told to take the shoes from Dobbin's feet,
Saunter right up to the hossy,
Real important-like and bossy,
Force his feet into a vise and do it neat.

When a man comes with a tire
And a wheel held with some wire,
And he asks you if you'll fix it up like new,
Tell him that it is your custom
To set tires right or bust 'em—
But to burn it is the proper thing to do.

Says a lady, young and pretty,
In a motor from the city,
"I am stranded—can you start it up for me?".
Then you take a lighted candle,
Grab the auto by the handle,
Poke the light into the fuel tank, then — you'll see.

When a man brings in a hammer
Wants it dressed in proper manner,
You just say yours is the best show on the road.
Then you dress his hammer dandy,
In a hobble skirt, real handy,
And a bonnet modeled on the latest mode.



What do you think of electrical equipment now?

A first-class doer of first-class work is sure of a first-class business.

Ever hear of anyone exceeding the speed limit on the road to ruin?

Seems rather strange that no matter how hungry a horse may be, he will never eat a bit.

It's generally the man who knows the least about smithing who thinks he knows the most.

Would you be better or worse off than you are now if you had just exactly what you deserved?

Try some of this new roofing on the shop. It is easily applied, and you know it's poor policy to let the roof go too long.

Return a smile for every frown. Can you imagine the devil having anything to do with a man who follows that motto?

There's a big advantage in starting while young and that is: If you make a bad start you will have time to begin all over again.

> **Uncle Billy Martin says:** "'Taint hard work ter size up a man whose dog crawls under the house when it sees him come thru the gate."

Have you seen any of the new herd? Drop us a postal and we'll head a herd your way immediately. And the new design certainly looks very good.

Tighten up on expenses and losses. Then you'll fatten profits without increasing the selling price. But don't hesitate to advance prices when costs increase.

Yes, there'll be a shop number very soon, and we want lots of good shop pictures and pictures of good shops. If you haven't a photograph of your shop send us a floor plan.

Which? Electricity or hand power? Don't persistently stick to white-haired methods in these brown-haired days. Electricity in the smith shop is no myth, and this issue proves it.

Ask your jobber or your jobber's salesman about our coupon system of renewing subscriptions. Even if you don't need to renew immediately, you'll want to know this new time-saving system.

Friend Thomas'es shop is antique—
As shaky as any you'd sique.
When it's rainy and wet,
Tom gets soaked, you can bet,
For the roof is just one great big lique.

You don't cut costs when you reduce the selling price. You must cut costs before a selling price is made. Cutting the selling price means cutting profits, and if you think your profits are too big, then cut your prices.

How can you make a fair profit if you continue to sell at the same old prices of years ago. Costs have advanced—you know that—and you must raise your prices to customers if you hope to stay in business.

A certain number of shoes and nails won't shoe a horse correctly unless a certain quantity of brains is used. It's not only the materials we use, but their intelligent use as well that makes a good or a poor job.

There certainly must be something in which you excel your competitors. Find out what it is, and then make a big noise about it. And keep making a noise until you find things coming your way. Then continue your noise.

Knowledge is power all right, but what good does it do a man if he keeps it to himself and never makes use of it? Or if he doesn't know how to use it? It's one thing to own a machine, but another thing, entirely, to use it with profit.

Most people think that tomorrow depends upon what we are planning to do. Take care of tomorrow as if today were the only day you had to live. Live and work and do each day as if it were a little life. Then tomorrow will take care of itself.

Our advertising columns are open to readers also, and any of "Our Folks" can purchase space just as cheaply as the largest manufacturer. Ask how we can help you to place your tool or machine before the biggest and best family of smiths in the world.

Don't extend credit in a haphazard way. When a man asks for credit, ask him where he's been trading. Then look up his record, ask the grocer, the butcher and baker about him, and then be guided accordingly. You may be certain that a man who will not pay the grocer or butcher will not pay the blacksmith.

Bear in mind when looking over your books and sending out bills that the man who honestly intends to pay will not take offense at a just and fair request for settlement. And if a man is dishonest he deserves little leniency. Get after him "hammer and tongs."

Even though it be a little every week, put it by for a rainy day. The man who waits until he gets a sum large enough to save never saves anything. It's the little and often that fills the purse. Just try a quarter or dime a week. Put it in the bank at interest and get an actual demonstration of the "little and often" maxim. Try it today.

Did you ever stop to think what a big asset the salesman's smile is? Just think of the effect a cheerful salesman has on you, how willing you are to give him your orders. Why not apply cheerfulness to your business. Be cheerful and smile, be big-hearted and square, be good-natured and friendly. It pays, Mr. Man, in sound, hard dollars and cents. And costs you — nothing.

A horse story from Pittsburg is interesting: "Where's Kate?" asked John Muldoon, driver of the emergency wagon at the Parkway office of the Pittsburg Railway's Company, in the North Side. "Kate," one of his pair of handsome black horses, was missing.

Nobody about the stable seemed to know, and Muldoon thought one of his helpers had taken "Kate" to the smith's to have a shoe put on. She had lost one on the last trip. At the smithy Muldoon found her, but none of his helpers was in sight.

"She just came strolling in here, as easy as you please," said the smith. "I bet if you go away 'Kate' will go back, herself."

Out of curiosity Muldoon hid in the rear of the shop until a shoe had been put on "Kate." Then she was turned loose and, sure enough, she started up the street toward her home. Muldoon found her in her stall when he slipped in behind her.

After noting the conviction of ex-Judge R. M. Campbell on the charge of embezzlement, the *Mansfield News* says:

It was more than half a dozen years ago that George Frey of Ashland, then a blacksmith, became convinced that the court house at Ashland was in control of a "ring." The estate of his own parents had melted away in the hands of lawyers there. He attempted to force payment from these lawyers and a peace warrant was sworn out against him.

Frey set about the study of law, working at his forge to pay his way. He was admitted to the bar and ran for county prosecutor on a promise to "take the roof off the court house" and show what was going on beneath. The group most conspicuous in Ashland County politics laughed at the pretension of the blacksmith lawyer, but the men whose horses Frey had shod for years and whose wagons he had ironed were willing to give him his chance. He was elected by a big majority after a campaign in which he went all over the county on foot soliciting votes. They elected him a second time, and a third. The trial of former Judge Campbell this week marked the climax of his fight to take the roof off the Ashland County court house and to show what lay beneath.

American Association of Blacksmiths and Horseshoers.

Smiths generally realize the many advantages of organization, but hesitate to start a movement in their localities for fear that neighbor-smiths will not take hold and co-operate. Of course, the greatest benefits are realized when every smith in the county is in the organization, but because one or two smiths do not realize the benefits to be had you need not stop. The chances are, such men are simply waiting for someone to make a good start. Don't wait for your neighbor. Make the start yourself. He will soon "come in" when he sees the advantage to be gained by joining hands with you.

As a rule, the man who will not join an association is one whose work is not up to standard and who depends upon cut prices to keep him going. He is usually a poor workman, with poor tools and equipment, who will do work for most any price. He doesn't as a general thing control much trade and is, therefore, not to be very seriously considered.

But sitting quietly in the shop or reading these articles every month won't alone give you better prices or form an association in your county. It requires action—good, prompt, vigorous action. Co-operation with your brother-smiths. A postal card request to me for association plans—then vigorous action on your part, assistance from me—and a strong, growing association will soon result; and the cost to you is the penny for the post card. Surely the result is worth it; surely you can spare that for better prices, harmony and improved craft conditions.

Now is an excellent time to start this movement in your county. Smiths are better able to go to a meeting now than when the roads are buried under snow-drifts. Send today for my easy plans. Address a post card now to me, at P. O. Box 974, Buffalo, N. Y. It will take you but a minute, cost but a penny, and by return mail you will receive my easy plans for forming branch associations. Will I hear from you today?

THE SECRETARY.

The Blacksmith.

W. H. GUNN.

The December number of "Our Journal" contained some excellent reading. Especially did the article of Friend Thornton strike me. That is right:—talk up the business and the honor and dignity of the craft. Were it not for the blacksmith, the wheels of industry would stop forever.

Gold may represent the glitter of an ornamented surface but iron is the bone, sinew and muscle of the world's mechanism.

The fascinating dandy, in faultless dress, may be a necessity of the drawing room, and the charm of elegant leisure; but the blacksmith, with his brawny arms, soiled apron and a face marked with honest toil, has been selected by the great masters of art as the embodiment of all the splendid achievements of honest labor.

No other profession has been portrayed in such an honorable blaze of glory by the disciples of Angelo and Raphael as the blacksmith and his anvil.

Some Thoughts and Experiences on Steel and Steel Working—2.

E. R. MARKHAM.

The two tools previously mentioned, made from the same bar and made so the cutting ends had, in the bar, been next to each other, and which, when used, gave entirely different results, were made different in form in order to illustrate the point we are at present trying to establish. One tool was made nearly straight up and down on the surface, while the top of the tool at the cutting end was made nearly flat. The other tool was made with a proper clearance angle. The two tools were hardened as nearly alike as possible. When put to a test, Figure 1 would do very little cutting, while Figure 2 of the same bar, and with the same speed and feed, cut for a length of about five feet before it needed grinding.

A steel salesman brought me, a short time ago, a tool made from a piece of 3 by 1½-inch high-speed steel which would not stand up in competition with tools made from other steels. He claimed he could not understand the inability of the tool to stand up, as at a previous forging the tool had beaten out all competitors. After repeated grinding, it was necessary to re-forge and harden it with the result mentioned. An examination of the tool showed it absolutely wrong as far as shape was concerned. The tool was ground and rehardened, and in competition was able to hold its own with the best of the competing steels.

The writer does not mean to convey the impression that all cutting tool troubles are due to the shape of the tool; but he does contend that many times this is the case. Improper hardening leads to trouble many times, both with tools made from carbon steel and also those made from high-speed steel. In recent years many shops have added to their equipment one or more pyrometers, the management being convinced by some glib-tongued salesman that mistakes in the heating of steel were impossible if one of their devices were connected to the heating furnace. Now, under many conditions, a pyrometer is a valuable addition to our equipment, but its installation does not warrant our trusting valuable tools to the care of a poor workman. It is a well-known fact that, as a rule, the installation of complicated automatic machinery generally calls for the employing of more careful operatives. But the amount of work turned out more than compensates for the cost of the machines and help. In the installing of a heat-measuring instrument we should look on it as a means of enabling our skilled hardener to produce more and better work, and not as a means of replacing him with a poorer and, consequently, a cheaper man.

A pyrometer, if it is correct, registers the degree of heat at the end of the instrument in the fire, not necessarily the temperature of the piece of steel in the fire. In order to accurately gauge the heat of the steel in the fire we must determine by tests the variation necessary in the reading of the instrument. For instance, a tool made from a certain steel may require 1400 degrees Fahrenheit to bring it to the proper condition for hardening. In order to bring it to that temperature it may be necessary to heat the furnace so the pyrometer reads 1450 degrees, 1470, or even higher. Having learned to accurately gauge our heats by making due allowance for the reading of the instrument one may

duplicate the proper heat any number of times.

I know two men—hardeners in shops several miles apart—both of whom had occasion to harden tools that were nearly identical. The first one to harden the tools had excellent results by running his furnace so the pyrometer registered 1425 degrees F. Meeting the other hardener he told him of the result of his experiment. The latter ran his furnace so his pyrometer registered the same, heated and hardened several tools and found they did not stand up at all well. As the tools were made from the same make and analysis of steel, an investigation was made, and it was found that there was a difference of over 100 degrees F. in the reading of the instruments.

If we learn what temperature, as recorded on our pyrometer, gives good results, we can duplicate a desired temperature any number of times, providing the reading of the instrument does not change. If we desire to determine the accuracy of the reading it is possible to buy clay points which have a definite melting temperature. These may be placed in the furnace at the end of the wire, and by gradually raising the temperature of the furnace and closely watching the reading we may be able to determine the accuracy of the reading. A pyrometer is a valuable help for a brainy man, but in no sense a substitute for brains.

I visited a very large factory a short time ago where they were testing out a number of kinds of high-speed steels. The tools were forged, then carefully annealed, after which the points—cutting ends—were heated to a fusing temperature. The tool was thrust into a sheet-iron box having a strong blast of air supposed to strike the point of the tool. An extremely careless man was doing the hardening; some tools were placed in the box so the air struck the cutting end, others were thrust so far in that the air struck at least two inches back from the point—and the steel was being judged from the work done by the tools! The attention of those in authority was called to the manner in which the hardening was being done, and resulted in their taking the box to the machine shop where a hole was cut in the side of the box. The hole was covered with a strip of mica, and so it was made possible to accurately locate the point of the tool in relation to the blast. Greater efficiency was obtained also by tipping the tool up on one corner of the bar, so the air, instead of striking exactly on top of the tool, struck on the corner, thus cooling both faces that made up the cutting edge. All the previously hardened tools were rehardened, and most of them showed an added efficiency of from 25 to 200 per cent.

To obviate the troubles we have considered, many steel concerns prefer to furnish a forged and hardened tool for test purposes. From THEIR standpoint this is advisable. If I am buying a steel and wish to give it a test I want the tool made in my shop under the same conditions other tools are to be made. There is a great deal to say on both sides of this question. I know of a steel concern who have in their office a lathe tool that has beaten out almost every tool it has been placed in competition with. Yet they have never been able to furnish steel that, when made up into tools, could begin to duplicate the work done by this tool.

FIG. 1.—SECTION OF PIPED BAR

I had occasion to go to a factory a short time ago where they were making tests of lathe, planer and boring-well tools, made from six makes of steel. The tools were all forged and hardened in the shop. No sample piece of steel was accepted that had the maker's name stamped upon it. As each sample was accepted, a number was stamped on it and it was sent to the tool smith. No one in the factory knew which piece of steel was furnished by any particular concern and, as a consequence, a perfectly impartial test was assured. I am sorry to say that I have known an occasional hotel dinner and theater ticket to make considerable difference in the efficiency of certain steels as reported after comparative tests; but by the method just mentioned this evil was done away with. It is a very easy matter for an interested party to make or unmake a steel, so far as that factory is concerned.

High-speed steels have revolutionized machine-shop practice. They are used in many shops altogether for certain classes of work, and many times the amount of work formerly produced has been the result. It has been tried for many purposes where experience has proven carbon steels were better suited. In such cases, however, the desire to increase the output has led to improving many of the carbon steels and also to perfecting the methods employed in making and hardening the tools. I recall certain blanking punches used in the punch press for punching pieces from sheet steel. High-speed steel was substituted and found to produce 25 per cent more work. This led the steel concern who had formerly furnished the carbon steel for the punches to make a steel containing a small amount of tungsten and chromium. This, when made into punches, produced 30 per cent more work than was possible with the high-speed steel. Manufacturers are also coming to realize that steel, properly forged, hardened and tempered, will many times produce a great deal more work than if improperly treated—in fact, it will often produce many times the amount of work.

Where changes are made in the composition of steel it is absolutely necessary many times to change the method of treatment, and this, of course, means that a good man must be employed in order that everything possible may be gotten out of the steel.

I am sure that a few years hence the man who forges or hardens tools in the up-to-date shop will be looked upon as one of the most valuable men around the plant, and treated and paid accordingly. In some shops this is true today; and the fact that a successful hardener of steel can be the means of reducing the expenses of a manufacturing plant very materially is recognized. Let us trust that manufacturers generally will soon realize that, while the chemist is a valuable man—providing he is a practical man—yet the fact remains that the man in the hardening room, if he is the right sort, is the really valuable fellow.

Treatment of Steel Before and After Machining.

J. F. SALLOWS.

A very great mistake a number of manufacturers of automobiles and other steel-using firms make is using the one or nearly the one grade of steel for all kinds of work. But, after a time, they come out of the old rut, when it has cost them a few thousands of dollars.

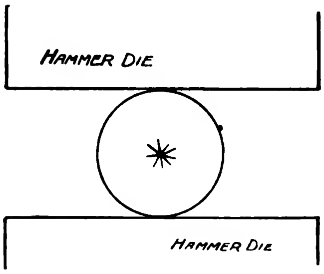


FIG. 2

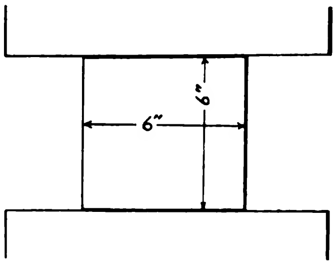


FIG. 3

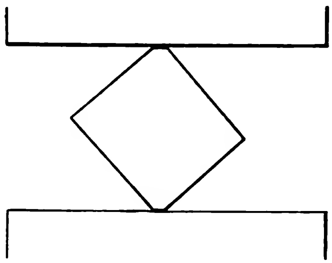


FIG. 4

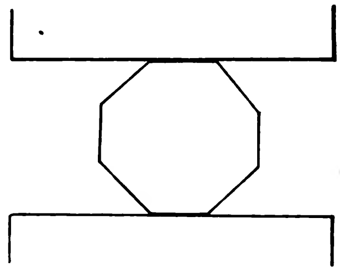
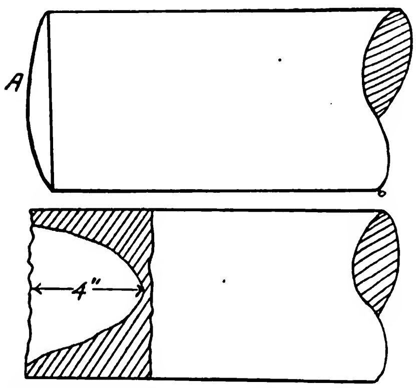


FIG. 5

THE INCORRECT AND ALSO THE CORRECT WAY OF FORMING ROUND BARS

Take, first, the question of tools made in the tool-room of a large plant. If care is not taken, a great loss can be caused here by not using the right grade of steel for each particular class of work. A punch and die should not be made from 110-point carbon steel any more than a finishing lathe tool should be made from 40-point carbon steel. A



FIGS. 6 AND 7—THE EFFECT OF HEAVY AND LIGHT BLOWS

great deal of the trouble sometimes arises in the stock department. For instance, the steel is unloaded in the receiving department, and is consigned to the stock department where the saws are located, and any department in the plant wanting some steel for a certain job will send an order to the fellow of the steel department like the following: "Cut off two pieces of 2½-round, T. S., 10-inch long." Now, if the steel fellow is not pretty sharp, he will make a mistake, and, still, he is not to blame if there is no system to his department. The writer has seen orders written as before stated, and the pieces were cut off and sent to the tool-room for machining. After spending two or three days' time on the job they are sent to the hardener for tempering, and, after repeated trials, that fellow finds out that the parts are made from cold rolled steel, or, perhaps, are 15-carbon open-hearth steel. Then, again, they are liable to be high-speed steel, and if high-speed steel is ordered from the man on the saw he is apt to deliver tool steel. All of this trouble and expense is as much the lack of system as the fault of ignorance on the part of the fellow on the saw job. The fellow machining should be able to tell the difference between high-speed steel and tool steel, or tool steel and cold rolled steel. But it seems to be up to the hardener to find out after all the expense has been laid out on the job.

Now, those conditions do exist and always will, unless a system something like the following is adopted: Here it is—read it carefully: Have a book with a color chart in it; then, have all the steel already on hand in cut-off department analyzed, and painted the entire length of bar with a narrow stripe the same as shown by chart in book. For instance, if in book it reads like this: "Red stripe denotes 90-point carbon steel," or blue stripe denotes such a make of high-speed steel, and so on all along the line. The fellow in charge of the saw department should have one of these books as well as the fellow in the receiving department, and the fellow in the receiving department should do all the striping of bars when they come in. After they are dry he should deliver them to the stock department. If this system is adopted there will not be many mistakes along this line, and it will be the means of showing a larger dividend to the stockholders at the end of the year.

Of all the mechanics in the business today, there is none more unjustly abused than the hardener or steel-treating smith in a large plant. He gets the blame for all the trouble, no difference where the cause. The skilled mechanics in the tool-room and machine shop jump on the hardener, and he has no redress. Recently the writer's attention was called to the fact that the large hollow mills were breaking, and the persons complaining thought the trouble was with the fellow who did the hardening. The tools referred to were made from a well-known line of high-speed steel, so something must have been wrong. The writer started into a thorough investigation of the matter. In the first place he found the bar of steel that the tools were being made from, and found a bar that had seams running the entire length—see Fig. 1. And when the tool-room foreman was asked why he was using such steel as this, he claimed that he was boring the bad center out. But there were small seams, not visible to the naked eye, but could be seen with the glass, that still remained in the tool when finished; and yet the tool-smith was getting all the blame for the carelessness of the tool-room foreman. There are different reasons for steel having this seam in center of bar. One reason is as follows: In the mills the steel when heated and taken to hammer is rounded from first to last—see Fig. 2. The hammer man keeps rolling continually, and the blows of the hammer are perhaps too heavy for the size of bar; this affects the center of steel. If the bar was drawn down square, as shown in Fig. 3, then the corners knocked down, as in Fig. 4, and drawn down octagon, as shown in Fig. 5, there would be less of this trouble. If the blows of the hammer

FIGS. 8, 9 AND 10—SHOWING THE EFFECTS OF PROPER HEAT TREATMENT

FIG. 11.—THE TEST OF GOOD HEAT TREATING

are of the proper weight, the end of the bar will look about as shown at A, Fig. 6. But, if the blows of the hammer are not heavy enough, the center of bar will be way in, as shown in Fig. 7. Tools made from bars of steel made in this way will seldom give satisfaction.

Now, in regard to steels for different kinds of jobs. Arbors of all kinds and sizes should be made from 15-carbon open-hearth steel. After turning almost to size, leaving just stock for grinding, they can be carbonized and hardened. If they warp in hardening they can be easily straightened, while if made from high-carbon tool steel they are liable to break in straightening, and are altogether too costly in these days of successful casehardening. Take a look at

FIG. 12.—ANOTHER TEST OF GOOD WORK

the engraving in Fig. 8. This is part of an arbor that has been used for two years steadily, and has a case about ¼ inch thick and a very flexible core. This arbor was carbonized for ten hours at 1700° F. and set out to cool, then reheated at 1600° F. and quenched in cold water. The carbonizing agent used was the Blaich Modern Carbonizer. It is composed chiefly of leather, which is the best agent so far discovered for this class of work. Then take drill jig bushings of all sizes. They should be made from open-hearth steel instead of high-priced tool steel.

A great many tool steel bushings break when driving or pressing into the jig after hardening. Carbonized bushings would do away with this and be a great saving to the firm in the end of a busy season's run. Forming dies of all kinds used in punch press work should be made from low-carbon steel and carbonized. In fact, a saving of a great many dollars could be made if a little judgment were used regarding the class of steel used in all the parts in a large factory. If the same carelessness were manifest in the construction of the first-class automobile as there is in the tools and fixtures of the factory, the auto would soon go to pieces and the entire business would be tied up. But more care is used here. For instance, take the steering spindle, shown in Fig. 9. If these were put in the auto as they come from the drop forge they would be dangerous to life and property, being very brittle and crystalized. Then, take

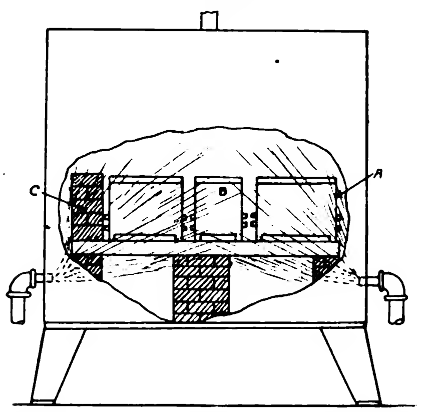


FIG. 13.—THE CORRECT AND INCORRECTLY BUILT FURNACE

the same class of spindle in Fig. 10. After being heat treated it was impossible to break it, and at the same time it is very stiff. The connecting rod, shown in Fig. 11, before heat treating is as brittle as cast iron, and could not be used unless treated as shown in Fig. 12. It is twisted like a twist drill, and very stiff and impossible to break. Now we will show how this is brought about.

Take such parts as connecting rods. If they are as they should be—about 40-point carbon steel—all there is to do is to heat to about 1500° F. and set out to cool slowly. But, if they are very far below this—say 25 or 30-point carbon—the above treatment will not do. They will be altogether too soft and at the same time brittle. They should then be treated as follows: Heat to 1500° F. and quench in strong brine, then heat to about 800° and let cool slowly. The first operation removes the crystals, and the second operation renders them tough. It, of course, makes a great deal of difference how the parts are heated. If they are thrown in an open furnace, and the gases have access to them, poor results will follow. This is no way to heat anything, but a great many do so and wonder why they can't do as well as someone else. Take a good look at Fig. 13. This shows the average oil or gas furnace on the market today, and is wrong in more ways than one.

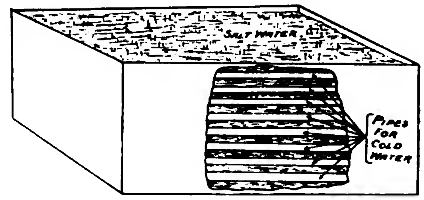


FIG. 14.—THE COOLED BATH

It has a flat bottom for the work to lie on, and no side walls, and the writer has known where the sides of boxes were almost melted at A, while the middle box, B, was not hot enough to remove. By building a side wall of fire brick, as shown at C, this trouble can easily be overcome and a uniform heat obtained. All parts should be placed in boxes for heating, whether for annealing or for hardening.

Then, the salt bath for quenching: Make a large tank and have a coil of pipe all around the inside wall of tank, like Fig. 14. The water used for regular hardening tank—and for all other purposes in the department—can be run through this coil of pipe, and the brine in the tank cannot become lukewarm, even if a large lot of parts are being dumped in. It is really the best method yet worked out by the writer. Fig. 15 is a top view of same brine tank. After the parts have been heated to 1500° F. and quenched, heat them to about 800° or 850°. A good way is to have the furnace a low red, so that you can just see the bed of furnace is red, then throw a lot of the parts in, and as soon as they become the least bit red rake them out

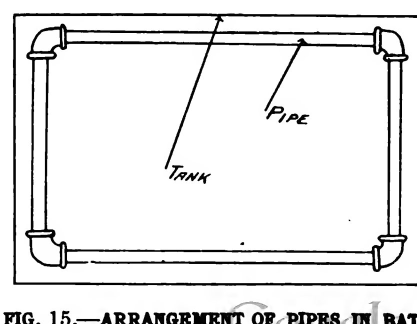


FIG. 15.—ARRANGEMENT OF PIPES IN BATH

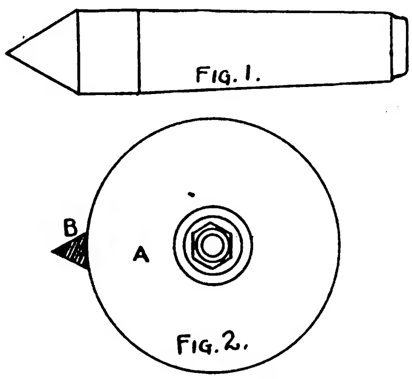
and let cool slowly. The furnace door should be kept closed while the parts are heating for the treatment, so as to have it as dark as possible, for if the parts are red in the light they are altogether too hot. A little practice at this will result in good work, if one is not careless. But it doesn't require much of a move either way to do a whole lot of harm along the line of heat treating steel. In our next article we will go into other parts of the automobile and show where simple mistakes make expensive trouble.

Plain Machine Work for the Blacksmith—9.

GEORGE CORMACK, JR.

The Lathe.

In giving the first instructions on lathe work the best policy would doubtless be to describe the simplest class of work done on the lathe. This would be an easy matter if it were permissible



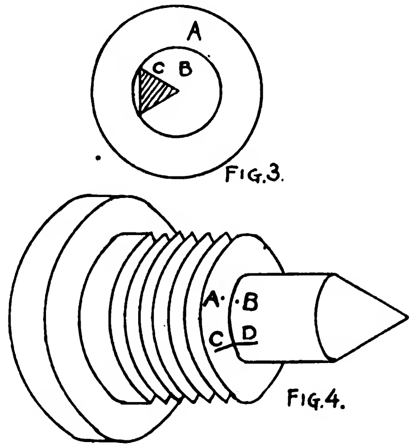
FIGS. 1 AND 2.—A LATHE CENTER AND A REAMER

to assume that all of my readers who started out to follow the instructions given had a lathe which was in perfect condition and adjustment. No doubt some of those who read this article have a lathe which is in this condition, but if such is the case the owner of the machine does not need instructions regarding the simpler classes of work, as his ability shown in keeping his lathe in proper condition is evidence that he has advanced beyond the preliminary class of work. It is necessary, however, considering that the bulk of the readers of THE AMERICAN BLACKSMITH have in their possession lathes which are not in perfect condition, to begin at the beginning. I will, therefore, show how the lathe should be put in proper condition to perform even the simplest operations accurately. Cylindrical work—straight round pieces—turned between the lathe centers is doubtless the first step in lathe work. This is the simplest kind of lathe work; yet the fact must not be overlooked that many jobs done between the centers of the lathe require the maximum of skill in their performance. In fact, the lathe is such an universal machine that in all the different and distinct classes of work done on it a skillful manipulation is necessary. It is absolutely necessary that the lathe itself be true, and one of the greatest troubles is that the beginner does not realize the importance of keeping his lathe in proper condition, and too often he has had no instructions on this point and therefore errs through ignorance.

Taking into consideration the fact that a large majority of the lathes in blacksmith shops and country repair shops are not in a condition to do good lathe work my initial duty is really to give instructions regarding the trueing up of the lathe centers. Although to the experienced lathe-men this is comparatively a simple job, it presents difficulties to the beginner which will require his closest attention and care to overcome. In connection with this, as well as in the case of all other machine work, it must be remembered, as I have several times mentioned in former articles, that absolute accuracy is almost unattainable, and that the best which we can expect to accomplish is to approximate it as closely as possible. Another characteristic of the good mechanic is never to take anything for granted. "Prove all things" is a good rule to follow. If this rule be followed all errors will be discovered before it is too late and compromises can often be made which will save much time and material.

A typical lathe center is shown at Fig. 1. The shank or tapered part fits in the lathe spindles. Both centers are alike; the one fitting in the head spindle is known as the live center, while the other one which goes in the tailstock spindle is called the dead center. These are so named, because, in the first place, the head center revolves with the lathe spindle and with the work; while the tailstock center is stationary and the work revolves, not with it, but upon it. It is evident that if the point of the live center does not run true any work revolving with it must be similarly out of true with its center. On the other hand as the work revolves upon the dead center and not with it, the work at this end must always be true with its center. The true running of the live center is therefore of vital importance, while the dead center can be out of true to quite a degree without affecting the cylindrical truth of the work; although the fact of its being out of true may seriously affect the trueness of the work in other respects. This point will, however, be taken up later when work between the lathe centers is fully taken up. In modern lathes all centers are hardened at the points, although not many years ago it was the custom to leave the live center soft, and harden only the dead center. It is questionable whether for ordinary work and in shops where there are no appliances for trueing up centers without annealing them it is not a better plan to leave live centers soft.

In the first place we will take up the trueing of the centers where both centers are hardened. In shops in which there are lathes in constant use this is done by means of a center grinder, which is an attachment comprising an emery wheel of small diameter which grinds the center while it is revolved in the lathe spindle. With such an attach-



FIGS. 3 AND 4.—A REAMER IN USE AND THE CENTER MARKING

ment the centers can be trued up in a few minutes, the latest types of center grinders being so readily attached that the time necessary to true up the centers is of such small moment as enables the lathe man to frequently true them up, and the more often it is done the less grinding is necessary at one trueing.

In fine tool room work where accuracy is of supreme importance the live center is ground true for nearly every job that is done. In small shops where the lathe is only occasionally used the investment in a center grinder, although in many cases it would be a distinct saving and advantage, is seldom considered necessary, other methods being resorted to when the centers require trueing up. The usual method is as follows:

First anneal the points of the centers, taking care to prevent the heating of

the center any further up the shank than is absolutely necessary. With a piece of fine emery cloth, No. 0 or No. 00, polish up the shanks and examine them closely to see that there are no bumps or bruises which would prevent the center from fitting solidly into the taper hole in the live spindle. Such bruises or bumps are usually caused by laying the centers amongst the lathe tools where other tools, such as wrenches,

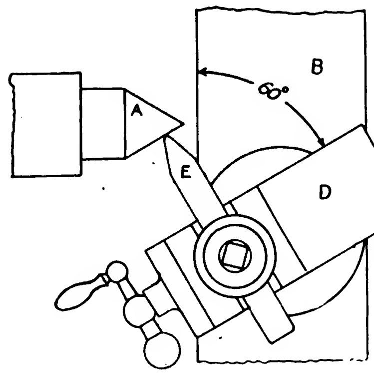


FIG. 5.—A COMPOUND SLIDE REST

files or hammers are liable to be dropped upon them. When the centers are not in position in the lathe spindles they should never be laid down amongst the lathe tools nor in any other place in which there is a likelihood of their being bruised. When out of the lathe they should be handled like eggs, the least bruise being enough to make the center run out when again put in the spindle. All such bruises are also sure to mar and spoil the hole in the lathe spindle. Lathe tools, wrenches, files, dogs or work should never be laid on the ways of the lathe bed. Carelessness in this respect will result in bruises in the ways which will throw both the tailstock and carriage out of line when run over the bruised spots. All these accessories should be laid on a board lying on top of the ways behind the tailstock. In this board holes can be bored, so that the centers can be stuck in these holes whenever it is necessary to remove them from the spindles. If there are any visible bruises on the shanks of the centers they should be carefully removed with a fine file and the shank polished and wiped clean. The hole in the live spindle should next be cleaned out with a piece of No. 00 emery cloth wrapped around a round stick. This is applied inside the hole while the lathe spindle is run at its highest speed. A plentiful supply of oil should be applied to the emery cloth. If there are any bruises or rough places in the hole, caused by carelessness in putting in the centers without careful cleaning of the shank or due to dirt or chips being in the hole when the center is put in, they will be readily felt. All such defects should be removed in the following manner: take a worn-out three cornered saw file about six or seven inches in length and grind all the teeth from the three sides, being careful to keep the sides flat. An even better plan is to grind the sides of the file slightly concave or hollow. This can be readily done on an emery wheel as shown in Fig. 2. The wheel should be small—say about ten inches in diameter—the file being applied as at B and moved backwards and forwards across the emery wheel A until all the teeth have been removed. This method will leave the corners of the scraper sharp, and the slight concave of the face will greatly facilitate the sharpening to a smooth edge on an oil stone. After grinding, all the faces should be whetted on an oilstone, laying each face flat on the stone and continuing the rubbing until all grinding marks are removed from the three edges. Such a scraper, when properly ground and oilstoned, is a very handy tool for many purposes, and is well worth the time spent in making a good one. In using such a scraper to remove bruises or rough places in the hole in the lathe spindle care should be exercised so that only the rough places are scraped. Run the lathe at a slow speed and apply the scraper as shown in Fig. 3. At A is the end of the lathe spindle, B the hole and C a cross section of the scraper. It is laid with one side flat against the side of the hole. Little pressure should be brought to bear, as the rough places will be readily felt as they strike the edge of the scraper. After the bumps are removed, the hole should be again polished out with the fine emery cloth and finally wiped out with a clean rag on the end of a round stick. Be sure that all particles of emery, dirt or chips are removed. Do not be content with one wiping, repeat it several times, finishing with a perfectly clean rag.

Now, take one of the centers, wipe the shank with a clean rag, and with a piece of chalk mark three or four chalk lines from end to end of the shank. Put the center carefully in the hole in the spindle, push it in until you can just squeeze it around in the hole. Turn it around two or three times and pull it out,. If there are no bumps or bruises in the hole the chalk will be smeared all round the shank; if there are bruises on the walls of the hole they will be evidenced by bright rings around the shank where it has come into contact with the bruises, while the balance of the shank will be untouched. If bruises are still present in the hole it must be scraped, polished and cleaned, keeping at until the center fits correctly. When a perfect fit is secured, wipe the chalk off the center shank and out of the hole and chug the center firmly into the hole. Take a wooden block, place it on the point of the center and hit it a blow with a hammer. This will send the center firmly into the hole. At all times when placing a lathe center in position in the lathe spindle be sure that both the shank and the hole are absolutely clean, as a very little dirt will throw the point of the center out of true. After the center is in place in the live spindle and you are ready to true up the point take a center punch and make two small adjacent center punch marks, one on the end of the lathe spindle and one on the center, as shown in Fig. 4 at A and B. A still better plan is to cut two fine lines with a cold chisel, one on the spindle and one on the center as at C and D, the ends of these lines joining where the center enters the spindle. The reason for this is that very often the hole in the spindle runs out just a trifle and when the center is taken out, if not put back in the same position in which it was turned or ground up, it will run out at the point.

The dead or tailstock center and the end of the tailstock spindle should be marked in a similar manner, and whenever the centers are taken out they should be replaced with the marks coinciding. The tailstock center should be given a distinctive mark—an extra

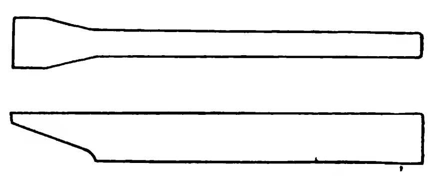


FIG. 6.—A FLAT-FACED TOOL

center punch mark is as good as anything. This center should never be used in the live spindle. The reason for this is that the wear upon it is always away from the tool, which has a tendency in time to wear the point on one side out of perfect truth with the shank. and if this center is used in the live spindle it will run slightly out of true, especially if it has been used for some time without being trued up.

Having accomplished all these things, everything is ready for trueing up the points of the centers. The proper angle for a lathe center point is 60

degrees. This is the angle of the V notches in the thread gauge described in my last article. In turning up the points, several methods are open to us. The points can be turned very quickly with a hand tool by one who is familiar

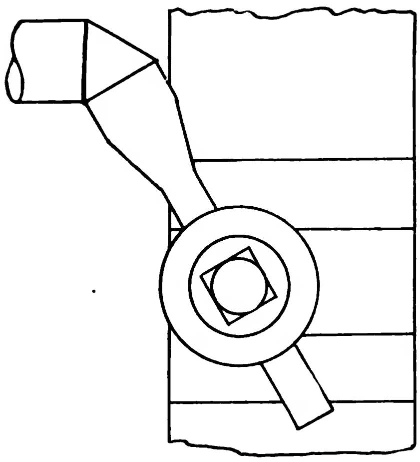


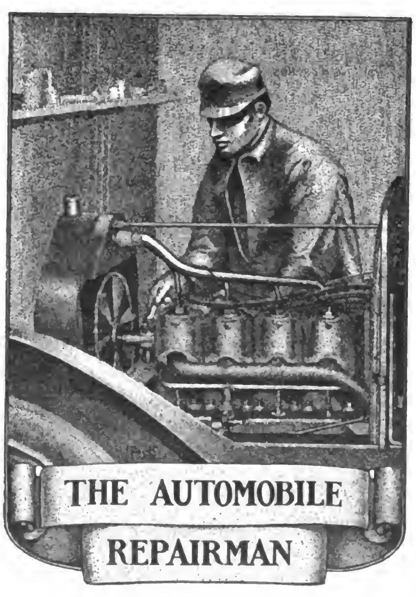
FIG. 7.—A SIMPLE TOOL POST

with the manipulation of hand tools for turning metal. This is, however, beyond the beginner, although later on when turning with hand tools is taken up he will readily see how it can be accomplished.

If the lathe has a compound rest, that is, a rest whose upper slide (which carries the tool post) swivels around to any angle, the turning of the points of the centers is extremely simple. The upper slide of the carriage is swung around as in Fig. 5, the tool point set level with the center of the lathe spindle and fed by hand along the side of the point, feeding from the point towards the shank. Fine cuts should be taken and the tool fed slowly. In Fig. 5, A is the lathe center, B is the slide rest or tool carriage and D the upper slide, known as the compound, swung round to the proper angle as shown. The tool E should have a slightly rounded point and should be kept sharp. After the first cut is taken across the point it should be tested with the thread gauge and the setting of the compound changed, if necessary. When the proper angle is obtained and the point turned as smooth as possible with the tool it should be finished with a few strokes of a fine file, the lathe being run at an increased speed while the file is applied. Do not, however, leave much for the file to do, else the chances are that the center point will not be true. After filing, polish with fine emery cloth and oil.

The method, when the lathe has not a compound rest, is to use a flat-faced tool of sufficient width of face to take the taper side of the point at one cut. Such a tool is shown in Fig. 6. It is held in the tool post with the cutting edge level with the center of the spindle as in Fig. 7. The cutting edge is, of course, set to the correct angle of the center point. The edge of this tool should be carefully whetted up on an oilstone. The lathe should be run very slowly, and lard oil applied to the cutting edge. If there is a tendency to chatter, slow down the speed of the lathe until the tool cuts smoothly. The center point should be tested with the thread gauge and the tool changed until the angle of the point is correct. Finish with a smooth file and polish with an emery cloth. Both centers should be turned up in the live spindle. In hardening the points the right degree of hardness is about that of a cold chisel, and the hard part should extend about half way up the point. Do not heat any farther back than absolutely necessary and do not bruise the shanks with the tongs. After hardening, polish up the shanks with fine emery cloth, put the centers in the live spindle and polish up the points and the job is finished.

A very simple method for sharpening and trueing hardened lathe centers, recommended by Mr. F. H. Colvin in his valuable book on "Engine Lathe Work," is shown in Fig. 8, which explains itself. The engraving shows the center on the emery wheel.



Adjusting, Repairing and Caring for the Automobile—3.

With Special Reference to the Packard Car. The Ignition System.

The source of the current for the production of the ignition spark in regular running is a low-tension magneto. The current from this passes through a coil which induces a secondary or high-tension current that is carried through the spark plugs to make the spark. For starting on the switch and for reserve there is a storage battery also providing a low-tension current, from

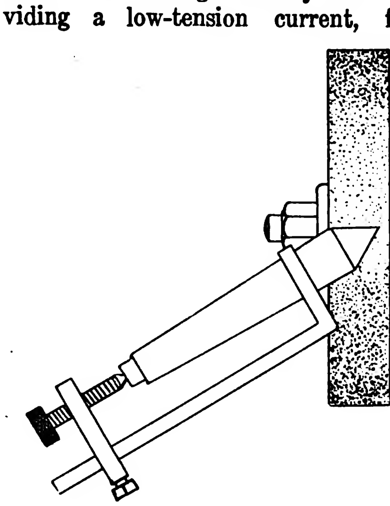


FIG. 8.—HOW TO GRIND CENTERS

which a high-tension current is induced by a different coil than that in the magneto circuit. The magneto and battery coils are in a unit box on the dashboard with a lock switch between them. While the primary circuits and the coils are independent, the secondary or high-tension circuits and the spark plugs are common to both systems.

The voltage of the storage battery is 6, and it has a capacity of 50 ampere-hours. The charging rate is 5 amperes. In all cars except the runabouts and the "Thirty" phaeton the battery is contained in a box on the right running board. In the runabouts and the phaeton the battery is in a leather case just back of the dashboard. The battery should be recharged whenever its voltage drops to 5.7. It is advisable to test the battery with a volt-meter twice a month. It is advisable after charging to wash the top of the battery with water in order to remove traces of acid. The terminals where the battery wires are attached to the battery always should be kept clean and tight.

The magneto is on the left side of the motor base, near the front end, and is directly gear-driven. By its magnets and armature it develops a low-tension current when the motor is running. The low-tension or primary currents from both the battery and the magneto are of good amperage, but are low in voltage.

The occurrence of the battery primary current in the primary winding of the battery coil is timed by a commutator. The commutator is on a vertical shaft at the rear of the left side of the motor.

It contains a roller, rotated by the vertical shaft, so that it comes successively into contact with metal segments or contact surfaces on a ring concentric with the shaft. The rotation of the shaft and the roller-holder completes the battery primary circuit at the times when the battery coil should act to induce high-tension current for ignition in the successive cylinders. The low-tension current from the magneto armature is short-circuited in the magneto when the points of the low-tension circuit breaker on the armature shaft are in contact. At the instant these points separate, the current is sent through the primary winding of the magneto coil. The sudden change in amperage in the primary winding induces a high-tension current in the secondary winding. Thus, secondary currents are rhythmically created for the production of sparks in the successive motor cylinders.

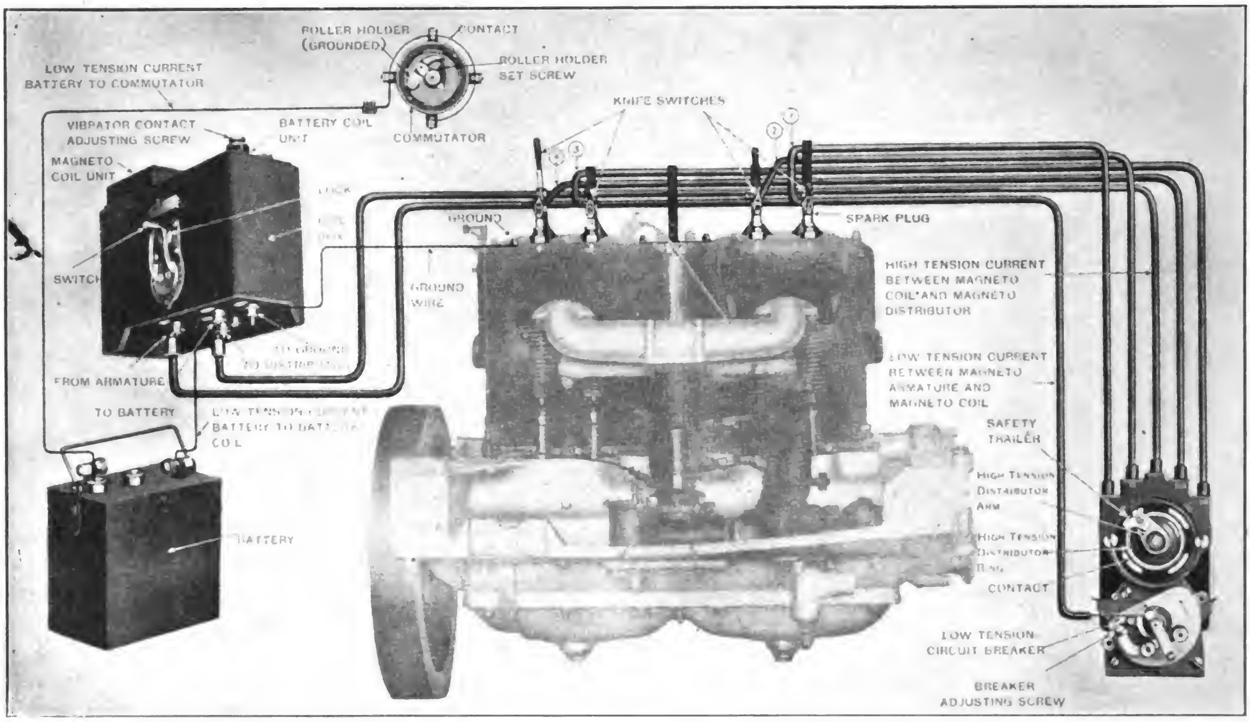
The battery coil is in the right side of the box on the dashboard. This coil is provided with a vibrator, which rapidly makes and breaks the primary circuit, thus inducing a rapid succession of high-tension currents each time the primary circuit is completed through the commutator. The final result is a brief series of sparks in the motor cylinder, instead of the single spark resulting from a non-vibrating coil.

The magneto is in the left side of the box on the dashboard. This coil has no vibrator. A high-tension current is induced from the magneto low-tension current each time this current is sent through the primary winding, as explained in the above paragraph on the action of magneto current. Each coil is a complete unit and may be removed from the case for inspection or other purpose, without disturbing any other part. However, do not remove or insert either coil without first placing the switch in neutral position. Neglect of this point may cause damage to the coil box mechanism.

In the center of the coil box is a switch which has three positions. Turn to "Battery" to run on the battery. Turn to "Magneto" to run on the magneto. Turn to "Off" to stop ignition. Above the switch is a key lock which permits the switch to be locked in neutral position.

A distributor mechanism on the rear end of the magneto completed the high-tension circuit through the spark plugs of the respective cylinders in succession, regardless of whether the origin of the current is the battery or the magneto.

The battery primary circuit connections are as follows: Between the battery and the commutator ring. Between the battery and the binding post marked "Battery," on the bottom of the coil box, between the binding post, marked "Ground," on the bottom of the coil box and a point where the wire is grounded on the rear cylinder. The commutator shaft completes the ground.



THE IGNITION SYSTEM OF THE PACKARD FULLY EXPLAINED

The magneto primary circuit connections are as follows: Between the low-tension circuit breaker on the magneto and the binding post marked "Armature," on the bottom of the coil box. Between the binding part, marked "Ground," on the bottom of the coil box and a point where the wire is grounded on the rear cylinder. The ground is completed through the magneto.

The high-tension circuit connections are common to both battery and magneto currents and are as follows: Between the binding post marked "Distributor," on the bottom of the coil box and the terminal on the center of top of the magneto distributor plate, the latter being connected with the high-tension distributor ring. Between each distributor contact terminal and the corresponding spark plug, through a universally pointed knife switch. Between the binding post marked "Ground" on the bottom of the coil box and a point on the rear cylinder. The ground is completed through the spark plug body. It is the jumping of the current across the gap between the center wire, or electrode, and the body of the spark plug that produces the spark.

The low-tension circuit breaker mechanism on the armature shaft should always be kept clean and with the contact points flat, parallel and correctly adjusted. The mechanism is protected by a removable aluminum cover. The

distributor should be kept clean and be very carefully oiled.

In case the magneto has been removed for any reason, replace as follows: Open the priming cocks. Crank the motor until compression begins in Number Two cylinder and slowly continue to turn until the Number Two piston is at the top of its stroke. This point is determined by lining up the dead center mark on the fly wheel rim with the center mark on the rear cylinder. Continue to turn the fly wheel to the left until the dead center line is about three inches past the center line on the rear cylinder. Rotate the armature until the magneto high-tension distributor arm comes onto Number Two contact. Slide the magneto into position, taking care to replace the sheet metal liners in their original position.

The commutator may be adjusted as follows: Fully retard the spark lever on the steering wheel. Open the priming cocks. Turn the fly wheel to the left until the dead center line is $2\frac{1}{4}$ inches past the center of the rear cylinder. Loosen the set screw which fastens the commutator roller holder. Rotate the roller holder clockwise until the roller just comes into contact with any segment. Retighten the roller holder fastening screws. Keep the commutator free from dirt and all its working parts thoroughly oiled.

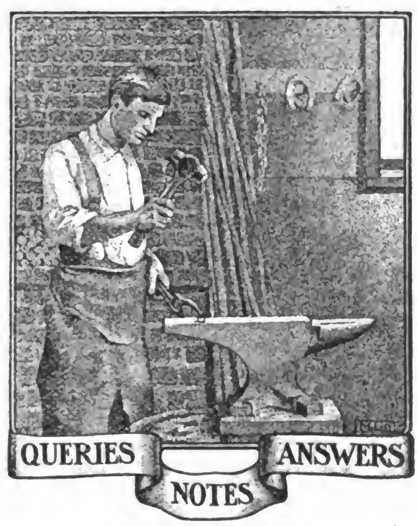
The vibrator on the battery coil may be adjusted by means of a thumb screw. Too tight an adjustment wastes current. A medium adjustment is best. The gap between the vibrator spring and the top of the induction coil core should be $1\frac{1}{16}$ inch. After determining this, turn the screw which adjusts the platinum contact point until the latter touches and presses slightly upon the spring. This adjustment gives the vibrator a liberal action and also insures that it will make a positive contact when vibrating. If there is sparking at the platinum points, the adjustment is not correct. When running on the magneto, the time at which the spark occurs in the motor cylinders, relative to the travel of the piston, is controlled by the low-tension circuit breaker on the magneto. When running on the battery, the time of the spark is controlled by the commutator.

By means of connections with the commutator and with the magneto low-tension circuit breaker, the spark lever on the left side of the steering wheel advances or retards the action of these two parts and, consequently, advances or retards the time of the spark in the cylinders. Although combustion of the charge under compression in any cylinder occurs rapidly, it is not absolutely instantaneous. There is a certain point in the travel of the motor piston, relative to the motor speed, at which the occurrence of the spark will give the maximum efficiency. Ordinarily, the

SHOP OF MR. L. C. SMITH, OF YORK STATE

spark occurs and the consequent combustion of the ignited charge starts just before the piston reaches the highest point of its stroke. However, if the spark is too far advanced for any given motor speed, the maximum effect of the combustion is exerted so long before the piston reaches its highest point that there is a tendency for the motor to run backward. If the speed of the motor is sufficient, this tendency is overcome by the momentum of the fly wheel. If, on account of low speed, the momentum of the fly wheel is not sufficient, there will be a tendency for the car to run with a jerky motion and the motor may be "stalled." This premature ignition is very liable to occur if the engine is started by cranking with the switch on "Battery" and the spark lever in an advanced position. In this case the starting crank will kick backward, with possible injury to the operator. Never crank the engine with the switch on "Battery" unless the spark lever is fully retarded. If the spark is too far retarded for the speed of the motor, the maximum effect of the combustion is exerted so long after the piston passes its highest point that some of the energy is wasted and, not being applied mechanically, remains in the cylinder as heat, tending to overheat the motor. In ordinary driving, carry the spark lever as far ahead as possible, without causing a spark knock in the cylinders.

When the spark lever is in retarded position, a safety trailer on the magneto distributor arm prevents the high-tension current from jumping forward to the contact for the next cylinder, which is under compression. Consequently, it minimizes the risk of the motor kicking back when being started. The ignition spark jumps across a gap between the split center wire, or electrode, of the spark plug and the serrated ring. If this gap is too wide or too narrow, the efficiency of the motor will be affected and miss-firing may result. The standard adjustment of spark plugs is a scant $\frac{1}{32}$ inch between the split center wire and the serrated ring. This adjustment gives a good spark for slow running and for hard pulling as well as for high speed driving. A wide gap, within reasonable limits, produces good results under light loads or at high speeds. However, when the engine is under a heavy load and the magneto runs slowly, there is a possibility of the spark not jumping across the wide gap, through the highly compressed charge. Thus the motor will miss-fire. If the gap is extremely narrow there is possibility of miss-firing when running slowly under a light engine load, because the length of the spark may not be sufficient to properly ignite the charge. The spark plug gap may be adjusted by bending the sections of the split center wire. The spark plugs should be kept clean to prevent short circuiting. The spark plugs are insulated with porcelain. If these should become cracked, short circuiting may result and the spark plug become inoperative.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

A Question on Roller Chains.—I would like to know how to determine the pitch of any block or roller chain as used on automobiles. What kind of a solution is used

to brass iron forgings to make them look like brass? J. G. SEBESTA, South Dakota.

Wants to Buy a Shaper.—Will you please tell me through THE AMERICAN BLACKSMITH what would be the right size and style of shaper to buy for a general repair shop, and what is the advantage of a geared shaper over the plain?

W. J. HILL, Indiana.

To Repair Cracked Cylinder.—Could anyone inform me how to make a rust joint in a broken gasoline cylinder head by using a plate put over candle wicking fastened over the crack in the head and using sal ammoniac and water in water chamber of cylinder. Have a gasoline engine with a crack in outer casing of cylinder head.

E. F. WINTER, New York.

Wants Special Shop Plans.—Would like to see plans published in the Journal for a tire heater to be built in the shop and plans for a double forge and chimney to be built in the center of the floor. The shop is going to be 40 feet square and all cement. Would also be pleased to receive plans mailed direct to us from any of the brothers.

MATHESON BROS., Coldfield, Iowa.

A Side Line Suggestion.—As a small side line in dull times try to make up a dozen or two good cold chisels and see how your customers will begin to look them over and buy them. Get a bar ⅝ oct. tool steel, and one ¾ oct. Nick the ⅝ at 6½ inches, the ¾ at 7 inches, and cut off hot. These will make chisels about right length when drawn out at head and edge. After drawing, grind all parts smooth on emery wheel. Where you have hammered, temper to a full blue, polish and rub with a slightly oiled cloth. These chisels sell for 25 cents and 40 cents each. I have customers calling for them all the year round. A. L. ERICSON, Ill.

Our Journal and the Chilled Mould Board.—You will continue to send me the paper, for I find it very useful and always look forward to its coming. Not very long ago a man came to me with the chilled board of his Oliver Chilled Plow broken. They are very expensive; they cost us 18s. As he was annoyed about its being broken, I said: "Never mind, I can mend it." "Oh!" he said, "it is impossible to drill holes in that." I said, "We will soon see." So I started, and in a short time had it drilled. He wanted to know how I did it. I said, "It's done, and if you had been a reader of THE AMERICAN BLACKSMITH you would have had no need to ask me. It's a very simple process, but few, unless readers of 'Our Journal,' know of it."

P. A. PHILLIPS, Scotland.

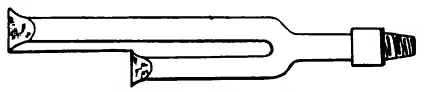
How to Specify Wood Stock.—In reply to Chas. F. Rahn, of Colorado, the following are the rules to measure wood stock: For felloes, measure tread and depth of felloe and depth of wheel; for tongues, measure width and thickness at doubletree; for spokes, measure width next to hub; for shafts, measure width and thickness of shaft or cross-bar near mortise.

G. N. SIDDERS, Ohio.

The Bellows and the Blower.—I also would like to get some information through "Our Journal." I have always used a bellows, but am going to put in a blower soon. We will suppose it is going to be a Champion. Is a 12-inch fan large enough for horse shoeing and general repairing, or would a 14-inch be better for all purposes? Would the latter run enough harder to make it objectionable?

G. N. SIDDERS, Ohio.

That Special Drill Bit.—In reply to Mr. H. O. Madison, of South Dakota, will say he can make his bit out of any ordinary well bit—either club or Z bit—by expanding one jaw a little and cutting off the other jaw. If for a tubular well—2-inch pipe or 2¾-inch hole—make a bit as in the engraving. Make this bit so it will measure across the widest part ¼ inch smaller than the inside of pipe casing. The upper lip will ream the hole sufficiently large for the tubing to follow. To the top end is welded about 4 inches of 1-inch gas pipe, a ⅝-inch



THE SPECIAL WELL DRILL BIT

hole drilled down the end of drill, which is welded on gas pipe and another hole through the side to meet the one in end. The hole must be countersunk, a steel ball large enough to fill this countersunk hole and a ¼-inch pin put through about an inch above the ball. This ball is to serve as a valve. Threads are now cut on this short pipe and extra pipes added when needed. As the work progresses, the cuttings are pumped out through the pipe by using plenty of water. Remove the bit only when dull or when repairs are needed.

J. S. HOFFMAN, Oklahoma.

A Smithy of West Australia.—I am always interested in reading the letters from other smiths. I have been in the trade since 1890 and started a business of my own here in 1898, since which time trade has increased from zero to £2,000 ($9,733.32) per annum. I make sulkies, buggies, wagons, drays, carts, tree pullers, scoops, etc., and repair vehicles and machines. This is a farming and wool-growing district.

I have been reading THE AMERICAN BLACKSMITH for several years and find it a splendid help. Last year I bought a 3-horsepower Old's Gas Engine and with the help of your paper I learned to run it so that it gives no trouble whatever. I use it for pumping, drilling and grinding. I use a semi-rotary wing pump (rescued from the scrap heap), which is worked by a crank from the end of the grindstone spindle. I find it saves a lot of labor to have water piped into the house and shop. I would not be without power again. I intend to keep adding to my machinery and get a bigger engine when necessary.

C. J. DARCY, West Australia.

A Special Drill.—In looking over the Journal, I saw a question of H. O. Madison, referring to a bit to drill rock, passing through the pipe and drilling a hole large enough to let coupling pass through. I am sending a sketch of the best one in the world, which I used twenty years ago. It will do the business perfectly. He does not say what size he wants, but it can be made any size, from one that will pass through a 2-inch pipe, or any size larger, by making the top cutter narrower. I used to drill oil and water wells and know this tool to be of great value to the well driller.

In order to make a bit to pass through a 2-inch pipe and drill a 3-inch hole below the pipe in rock, keep at least two feet below the pipe. If you want a larger size, make the land cutter narrower, also the top one, both in proportion to size wanted. In the 2-inch bit the bottom cutter cuts 1 inch, the top cuts 1 inch, making 2 inches. When the drill is turned around, the top cuts one inch on the other side, which makes 3 inches. It is easier to make larger sizes, as you can then make the drill stronger. This is made in one piece and will not break easily. If you need any further information concerning this, let me know.

CHARLES HARRIS, Louisiana.

How to Measure Wood Stock.—In reply to Mr. Chas. F. Rahn, of Colorado, who wants to know how to measure wood stock, to measure felloes make your order thus: 1 set felloes, 1½-inch tread, 2½ inches deep and 3 feet 8 inches and 4 feet 4 inch circle, or in a shorter way, 1½ inch by 2½ inch plus 3 feet 8 inch, plus 4 feet 4 inch circle. Wagon tongues are measured across the square part where the draw pin goes through, and will vary according to the size of the wagon. They run from 3 inches to 3½ inches, but the average size is 3¼ inches, depending on the make of the wagon. You may take two wagons of different makes and the size of the tongue will differ. The spokes are measured at the tenon at the shoulder, and will vary from 2 inches to 2½ inches, the average size being 2¼ inches. When, ordering spokes, say: 1 set spokes 2¼ inches front, or 1 set spokes 2¼ inches front and hind. The length of the spoke is never measured. Buggy poles are measured both ways, 1¾ by 2¼ inches and so on. In ordering spokes, always order "A select." Some will get C grade and D grade, but there is no money in a cheap grade of timber of any kind if a man wants to hold his customers—and that is what most of us try to do. C. W. METCALF, Iowa.

Some Abuses of the Trade.—Something that has come to my notice and which has caused me some thought is this: Why are horseshoers imposed upon so by the people? In most cases of horseshoeing, the customer will tell the shoer how much time he has in which to get his horse shod, disregarding entirely what the job at hand may require. I have had customers ask to have eight feet pared and leveled and eight shoes set complete in twenty-five to thirty minutes—They seem to feel that I ought to use an unusual amount of energy and utilize every possible bit of power I had, because they were giving me the preference—, on the other hand, is it necessary that shoeing be done at night, by lamplight, while during the working hours of the day shoers are almost idle, outside of calking a few shoes?

There is no other class of mechanics which carry as heavy responsibility as do the horseshoers. I call it a compound job. One has to be well read on the anatomy of foot and leg, and has to do a lot of lively stepping in order to turn out good work, to say nothing about the necessary amount of brains required for each job done perfectly and completely and in reasonable time. Take the carpenters—they don't do business that way; simply go to work about eight o'clock and quit about four o'clock—

eight hours for a day's work. The blacksmith starts about seven or so, is ordinarily still on the job at six o'clock, and if some customer demands his team shod after supper the shoer simply says "yes" and charges just the same price as during the usual hours of the working part of the day. I don't wonder why boys have no desire to learn the trade. As a rule, a horseshoer is expected to do two hours' work in one hour throughout the whole day. I feel that if the shoers would get together the county over, adopt rules and hours and show a little respect for themselves, in a little time it would become a more pleasant trade than at the present. I should like to hear other smiths' views along this line, through the columns of the paper.

ALBERT MEIER, Pennsylvania.

A Word of Appreciation.—I always find "Our Journal" both interesting and useful and am always glad to receive it. I am constantly on the lookout for something new in the shoeing columns, and as I read what one and another has to say and try the various experiments given I am considerably helped with my work.

First, I have to thank the giver of the receipt for chapped hands in the April number. As I suffer a great deal from chapped hands I got the things with which to make the ointment; but not having the fresh butter I used lard in its place and have already used my first mixture. I thought it so good that I have given it to others who suffered in the same way. They, too, were well pleased with it. It is splendid to clean the hands and soften them.

I read the news about the youngest animal shod and of the young shoers, but they are not so interesting as some other things. Anyone knows quite well that a child can do only a child's work. It has not sufficient strength to hold any but the quietest of animals to put on a shoe.

Regarding the setting of axles, which has come up for discussion, I have found help in these paragraphs. I would like some of our brother craftsmen to give their experience further in shoeing horses with pumiced sole and contracted heels. I think very often that such things need not only the care and skill of the smith but the care and common sense of the owner, which in many cases is wanting. I have followed the advice of some of our friends on a horse I have to shoe and have succeeded very well. I have one now, however, whose frog in the hind feet and the bars have quite gone, and the heels have contracted like a donkey's. I think the narrow feet are natural, as many of the same breed have the same narrow feet, but the cause of the frog and bars going puzzles me. Do our readers think standing in filth would help to make the decay, and what in their opinion would be the best way to relieve the animal?

We are experiencing a good time, good work, good seasons and everything and everybody busy. Our State is in a very good way at the present time.

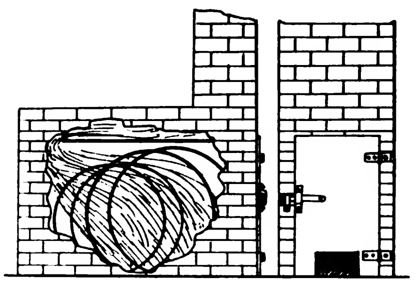
JOHN WM. GRIBBLE, South Australia.

A Tire-Heating Furnace.—I see in the Journal that Brother Kennedy, of New York, wants a tire furnace. I have outlined one the best I know how, which I know to be all right, for I used it for three years. It is made of brick, the partition between the fire and chimney being made of some old boiler iron, or something of that kind, as also the door. At the bottom of the door is the draft. You can see the smoke and heat has to go to the back end and then to the front in order to go out the chimney. We had one built at the end of the shop. The door opened in the shop and the furnace was all out of doors. The tires are rolled in. Then the shavings are put in and then the wood. One half the quantity of wood that it takes to heat a set of tires out of doors will heat two sets in this way.

T. E. SHERIDAN, Iowa.

How to Temper Stone Hammers.—Seeing among "Queries, Answers, Notes" a query from J. M., of New York, regarding the tempering of stone hammers, I shall be glad to give him such information as I can.

I am a blacksmith, but for a good many years I have been more interested in hardening, tempering, annealing and the heat treatment of steel. I have been in the automobile business for about fourteen years.



A TIRE-HEATING FURNACE

With reference to the dressing of stone hammers, a great deal of this work is done throughout the country, but few men take sufficient interest in the work to study it and get a thorough understanding of it. The main trouble is in overheating and heating too quickly. By way of illustration of a poor method of heating: Many blacksmiths will take the hammer and plunge it into the center of the fire, no matter how hot the fire may be. What is the result? The corners of the work are heated too quickly, while the center remains almost cold. The strain which has taken place between two extremes has already caused a crack, though the crack is not visible. The hammer is again heated and hardened and presents a pretty good appearance, as no cracks can be seen. If the corners do not fly off by cutting, however, the cracks will appear the next time the hammer is dressed.

Let us take a more scientific way to treat the stone hammer for hardening as well as for dressing in the forge fire. Take the hammer and lay it in the top of the fire for a few minutes, without using the blast, letting the hammer heat slowly and bringing it to a red heat in order to be able to dress it. After dressing, use the same method again, allowing more time to get sufficient red heat (say about 1375 degrees Fahrenheit, or 1400 degrees Fahrenheit), plunge it into brine not too strong, cool it off in brine (about 1¼ inch from the end) and let it cool off entirely in oil.

Treat the other end in the same manner as the first, but be careful not to let the temper run to the hardened end. If necessary to draw the temper for hard stone, lay it on top of the fire and draw it slowly and but very little, unless the steel is high carbon, in which case it may be drawn a little more.

Hammers treated in this manner will give better satisfaction than if the first method is used. It is of great importance for tool dressers and blacksmiths to remember to take sufficient time with the steel. It is time well spent and saves a whole lot of trouble, both for the smith and for his customer. CHARLES WESLEY, Wisconsin.

Lister Lays and Cold Setters.—I wish to say a few words in regard to those fifty lister shares hammered out by Brother S. B. Jewett in a day. I will not say that it cannot be done, but I would like to see the work finished before passing judgment. I do not believe that eighteen or twenty inches of soft center steel can be drawn out and held in the right shape in one heat, as hardened steel has to have a certain degree of heat to be worked right. I have used a good power hammer for plow and general work, so that I think I know what I am talking about. To heat evenly one half of the edge of a lister share a smith would require a coke furnace, and this would take all the temper out of a soft center lay. Also, I find that all the lays I sharpen are not alike; some being nearly worn out, so that I have to be very careful in sharpening them. And if I tried to sharpen one like that in two heats I would not be able to hold it in shape. Of course, as Brother Jewett says, there are all kinds of smiths. Naturally, I must be one of the poorest, as I cannot and would not sharpen fifty lister shares in a day of ten hours and guarantee every one to be true and finished in the perfect way in which I want my work done. I do not intend to offend Brother Jewett, for although I am near Nebraska I am not nearly in his class.

In regard to cold-tire setting I wish to say that I have the Mayer's cold-tire setter No. 1 for hand and power, and I consider it good. Of course, a smith has to use judgment in setting tires, and the lack of judgment is shown in so many over-dished wheels. I studied the cold-setting idea a long time before I decided to get a cold setter. I can set an average good tire, cold, quicker and as good as it can be set hot. Where the wood work is good on wagon and buggy wheels that are in good shape I generally shrink the tire in two places where the tire happens to be loose. The advantage I see by doing this is that by using power you can stop the machine at any time while driving the tire down over the spokes or sawing out the rim where wheel is rim bound. I have not had my machine very long, but I think that the manufacturers claim for the machine only what it will do when well understood. I can set tires on my machine by hand, and do set buggy and spring-wagon tires in this way, but when it comes to setting heavy wagon tires, power is far better. What Brother Hawkins asks in regard to every smith in the United States having a cold-tire setter, I think that the financial question comes at the head of the list with a good many of us. In some localities a machine is required which will set a tire 1 by 4 inches, which the average smith finds pretty expensive.

L. J. PISHNY, Kansas.

An Interesting Letter from Texas.—As I have read so many letters from other smiths living in the different states, and as I have just finished reading my journal, I will write something also. I have been running my own shop for the last ten years. I started in very poor, but at present I am doing very well. I do not think it a good idea for the average smith to depend entirely on blacksmithing, for this is no longer sufficient. We must pay too much for

the line of goods necessary that we keep in stock. Let me tell you the way I do business. I have a good shop, 30 by 60 feet. I have a six-horsepower I. H. C. engine and a Nordike and Mormon mill; one band saw; a 26-inch circular saw; a large power drill; a No. 1 Western Chief tire shrinker, and a No. 400 Champion blower. These are about the principal tools needed by a smith in a small village. I have also a Chicago clipper for clipping horses.

Now as to the way I do business. I do the shop. I take old buggies in exchange, and they hardly stop rolling before I have the wood chopped into kindling wood, the irons and straps are put in our pile and the old axles and top and dashboard irons go to the junk man as soon as I get a load.

I will close as my letter is getting rather long and some smiths may not like such a long letter as this one. You must not forget to buy some of those 1911 calendars and give them to your friends and enemies. Also to your neighbors who are not your

MR. JOHN LITTLE'S SHOP, OF ENGLAND

not raise my price on plow work and horseshoeing as I have a man and three boys to compete against. The man is an old smith and has been in this place for twenty-eight years, and does not at present own the land upon which his shop is built. I am selling buggies as a side line, and you ought to see the money I make. I sell the Banner Buggy from St. Louis, Mo., the International Stock Food, the Red Top Axle Grease, and all sorts of oils and harness, mostly single-buggy harness. I also handle lap robes of all sorts and decoy ducks and sell plows and wagons for the Canton and Molene Plow Company. It is easily seen that I make a good deal on such goods. Another thing I do is trading horses and mules. This also nets a good profit. If I had to depend entirely on hammering for a living, I would not win out in the end, but the more I trade the better I like it. It takes but very little time and pays well. You must always work it so that you get part of your money while the money is in the country and in the farmer's hands. After the other fellow gets it, it is too late.

Brother smiths, try my plan. Buy a little of everything in the hardware line, such as nails, staples, swedges, plow points and axe handles. You will make more money and make it more easily—more money with less labor.

Regarding F. G. Lewis' remarks in the November issue on the appearance of the shop, and the rubbish such as scrap iron, etc., which is constantly lying about the shop door, I think he is right. Try and clean up some day when you have nothing to do. It surely improves the looks of customers—you may get them. I will now close with the remark that "I always use cold water for drilling iron or steel." With best regards to all the readers of THE AMERICAN BLACKSMITH.

ED. GRIMM, Texas.

An English Smithy.—I don't think I should like to miss the paper, as I consider it very useful and instructive and well within its value. I take it that it will be of immense benefit to the craft, as I find I can always gather fresh knowledge from every issue, and I have been in the business forty-four years and still learning. We do a general blacksmith and farriers' business from the simplest smith's jobs to repairing an automobile. We have the job all to ourselves and no opposition within a radius of five miles. Our nearest trade neighbor is Mr. Wallace, of Neuthead, and I find through a conversation that we had a week ago that he is also a subscriber to "Our Journal." JOHN LITTLE, England.

He Favors Hot Setting.—Brother Frank Hawkins, of Kansas, needs some help on tire setting. I am "in the road" with Brother Hawkins. I like the hot tire setter better than the cold, because I believe the cold process is injurious to a wheel. Some will wonder why I say this and would like to know how I know. I will try to tell you. My first reason is that I have seen so many wheels ruined with a cold tire setter. I have seen them dished all out of shape. I have seen the rim busted up and spokes broken by drawing them too tight. Second, I have seen vehicles that had not been out of the shop more than one week which, upon having the tires set with a cold tire setter, would become loose and all the spokes would rattle, and a dissatisfied customer is another result. Third, I have taken old tires that had been set on a cold tire setter and cut them in two, and tried to straighten them out where the shrinker had gripped them, and they would break in two, in many instances showing that they had already been cracked. Fourth, to buy a cold tire setter a man has to be pretty well fixed financially, because they cost a man the worth of a pretty good set of tools to buy one, and it takes all he can make for a year or so to pay for it. Say, one cost $150.00, it would take 300 tires, at $ .50 per wheel, to pay for his machine. Now, if all the smiths were like Brother Lewis E. Calame, of Oklahoma, who can set 100 per day it would not, of course, take him very long to pay for it.

I have set tires on buggies and wagons that had been set no more than two weeks before with a cold tire setter. After I had taken the tire off and wedged all the spokes, measured my wheel and tire and found just how much to draw it, I would put it in my hot tire setter and give it just the required draw and put it on the wheel, guaranteeing the wheel for 12 months and very seldom having to reset this wheel under 12 months, to say nothing of having a satisfied customer and $1.00 more for the job than the man with the cold tire setter. I recall an instance of a man who drove up to my shop one day with his wheel all settling, and asked me if I could set those tires on his buggy. I told him that I certainly could, and when I commented on the job he told me that he had just had them set with a cold tire setter that day, and that it hadn't been two weeks since he had had them set before that with the same machine. When I assured him that it would be more than 12 months after I set them before it would be necessary to have them set again he said that it would be worth $3.00, that if it were worth $2.00 for two weeks, it would surely be worth $3.00 for 52 weeks. So I set the tires, and nearly three years after that he came back with three tires loose and said they had stood well enough, and so I gained a good customer and one that advertised for me and drew a lot of trade for me, and also brought me all of his other work. Also, I got $1.00 more for the job than the man with the cold tire setter, and wasn't cursed half as much.

There are cold tire setters all over this country, but I have never been induced to believe that I would have to get one to get my share of the tire setting. Of course, if I had seen the good results as a lot of other people have, I would get me a cold tire setter, but I still have to be shown.

I like "Our Journal" very much, and all the objections I have to it is that it is monthly instead of weekly. I enjoy reading the different letters from our brothers and wish I could write some interesting letters like some of the other brothers. I am like Brother Nick Jacobs, of Kansas, I would rather see Brother E. E. Mann put on those 12 shoes in 42 minutes than to read about it.

I have a nice little shop, with a number of good tools. I live out in West Texas in a little town with two railroads, and think that in a short time we will be one of the fastest growing cities in Western Texas.

J. H. REDDELL, Texas.

VOLUME 10

NUMBER 7

THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y. U.S.A.

APRIL, 1911

$1.00 A YEAR
10c A COPY

TIMELY TALKS WITH OUR SUBSCRIBERS

The American Blacksmith is published monthly at The New Sidway Building, Buffalo, N. Y., U. S. A., by The American Blacksmith Company. Incorporated under New York State Laws. Entered, February 12, 1902, as second-class mail matter at Buffalo, N. Y. Act of Congress, March 3, 1879.

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Albert W. Bayard, - - Secretary.
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Subscription Price: $1.00 per year in advance, prepaid to any postoffice in United States or Mexico. To Canada and other countries, $1.50, or, 6 shillings. Reduced rates to clubs of five or more on application. Domestic long-time rates, strictly in advance: Two years, $1.60; three years, $2.00; four years, $2.50; five years, $3.00. Single copies, 10 cents. Cable address, "Blacksmith," Buffalo.

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Austin English, Secretary-Treasurer, Kansas State Association, Hutchinson, Kan.

Our Next Number.

For some little time we have been planning to change the general appearance of "Our Journal," to change the general type arrangement, to make its pages still more readable, if possible. This month we are happy to say that, unless unforeseen obstacles arise, "Our Journal" will appear with an entire new type arrangement in May, the next issue following. The new type, we believe, is more easily read and the new arrangement of titles will be more pleasing to the eye. But when these changes are made, in next month's issue, just look at them with critical eyes. Let us know what you think of them. If you are not pleased don't hesitate to tell us so. If you like the new arrangement we'd like to know, also.

We are always looking for ways and means of improving and increasing the value of "Our Journal," and we are, of course, always glad to hear from readers with either praise or criticism. If you think that there is any feature that should be improved, tell us about it. We are here to please you and no one else. It is our aim to publish such a paper as will fill the needs and wants of the largest number of smiths.

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You Save Money.

Our very liberal long-time rates have been brought to your attention several times in these columns. Naturally, some of you have taken advantage of these rates. To give you some idea of how eagerly some of "Our Folks" took advantage of these money-saving opportunities we publish on page 171 of this issue a short list of those of "Our Folks" who are paid up farthest in advance. We shall publish this list with corrections each month. If you want your name on the "Honor Roll" take advantage of our liberal long-time rates. You can save two whole dollars on a five years' subscription, and if your subscription account is paid up far enough your name will be placed on the "Honor Roll." Is your name on the "Honor Roll"? If not, you can place it there.

Scotland and Alabama.

These letters that we pick out each month, these letters that we show you, are not exceptions to the general run of letters we receive. These few samples that we publish here show what hundreds of "Our Folks" are saying each month. And these letters come from every corner of the English-speaking world—from England, Ireland, Scotland—speaking of Scotland, here's a letter that will interest you. It is from Mr. George Cassie. He says: "I have been in the business so long that there is little I have not heard of, but I must say that your paper is most interesting reading and goes to the foundation of the making of several things in a very practical way."

And while we are quoting letters, here is one that is especially appropriate this month. Mr. J. F. Potts writes from Alabama and says: "THE AMERICAN BLACKSMITH I find is an indispensable helper. I find every department, from Shoeing to Auto Repairing, very beneficial."

And so we could quote from every part of this good old world. All write, it would appear, with one pen in saying that THE AMERICAN BLACKSMITH is the best smithing paper on earth—that it is truly helpful—that it is an indispensable helper for the practical smith. Why not tell your neighbor smith what THE AMERICAN BLACKSMITH is doing for you and the craft?

THE AUTOMOBILE AND THE COUNTRY HOME

Equipping the Automobile Repair Shop

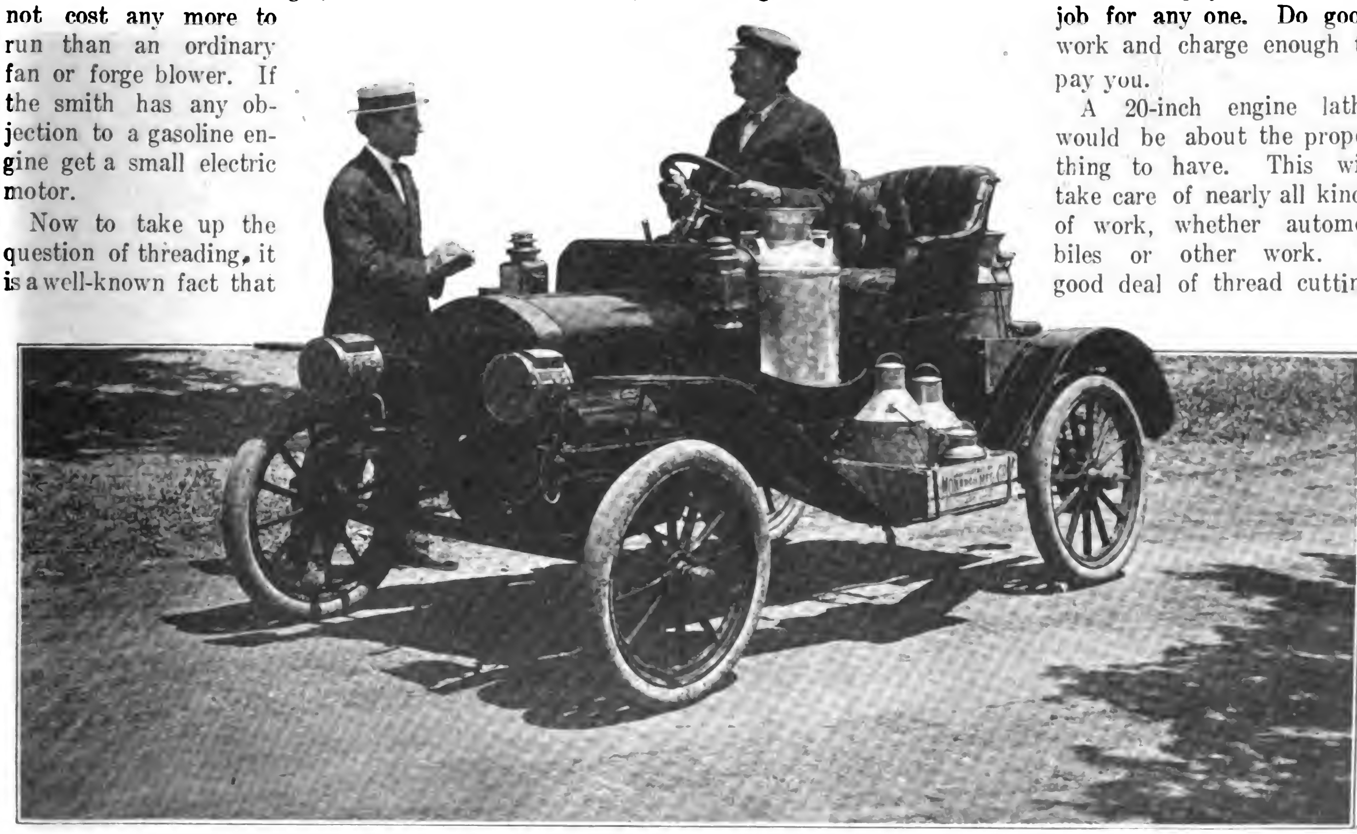
J. F. SALLOWS

THIS article is intended for such shops as have a small power plant, and all blacksmiths who intend to do anything along the line of automobile repairing should have power. In these days of gasoline engines the cost of a small power plant is small when compared with the large revenue derived from this line of work.

There should be installed at least one 20-inch engine lathe, a trip hammer, a drill press, an emery wheel, a thread-cutting machine, with dies ranging in size from ⅛ inch to 1⅜ inch, a small furnace for boiling cyanide for hardening and a brazing furnace. Now in order to run the two last-named tools, there must be a little air pressure: this can be had by installing a rotary blower. This class of blower will furnish quite a pressure and at the same time furnish air for forges, and will not cost any more to run than an ordinary fan or forge blower. If the smith has any objection to a gasoline engine get a small electric motor.

Now to take up the question of threading, it is a well-known fact that all manufacturing people make their own taps and dies of a size above ⅞ or 1 inch, and they are made in such a size as to be sure the owner will have to send to the factory for the repairs. This is a trick of the trade, so the only way for the repair man is to have a complete set of taps and dies in sizes before named, and United States Standard. If he is called upon to repair a piece that requires threading, do as follows: tubing is generally used instead of solid bar for most parts in all autos, and if the thread is stripped or worn on an external part and it is a drop forging or steel of any kind all you have to do is swage it down a little and tap it out new, and also thread internal piece over; thus getting a good fit. Now if the external part is a casting as they sometimes are, just tap out fresh with your tap of right size and, of course, the tubing will be too small. But we have a remedy at hand for this: See Fig. 1, a piece of tubing. Heat tubing on end A and drive a plug B of the required size to expand large enough to allow threading for a good fit in part tapped out. If the internal piece is bar stock instead of tubing do as shown in Fig. 2. Heat the end of the bar and split it lengthwise. Then drive a dutchman in, as shown at A. Drive down as far as X. Then take a good welding heat and weld, using top and bottom swage of required size. When piece cools slowly, thread and you will have a job as shown at B, Fig. 2. Never undertake to repair a job of this kind by staving up a piece, because you will shorten and have trouble at other end. Always do the best class of work and you will always have the best class of work to do, as well as a good class of customers to work for. It doesn't pay to do a cheap job for any one. Do good work and charge enough to pay you.

A 20-inch engine lathe would be about the proper thing to have. This will take care of nearly all kinds of work, whether automobiles or other work. A good deal of thread cutting



THE FARMER NOW USES AN AUTOMOBILE TO DELIVER HIS PRODUCT TO THE CREAMERY

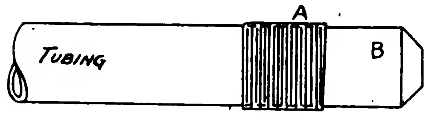


FIG. 1—HOW TO REPAIR TUBING

can be done in an engine lathe that can't be done any other way. Then about the air for brazing, Fig. 3 shows a rotary blower, a storage tank and a brazing furnace. The rotary b ower A and the storage tank B are on a couple of strong brackets CC on wall out of the way and take up no useful space. The belt D can come from a countershaft above the blower, and the large pipe E supplies the tank. Then we have pipes leading from tank to forges or brazing furnace or cyanide furnace; in fact, this tank will supply air for any thing we require air for in the shop. Pipe F leads to brazing furnace G; the furnace can have burners arranged one at each side and one at back. Have a valve H to shut off air from furnace.

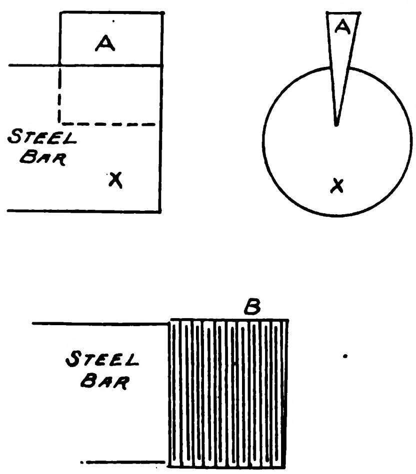
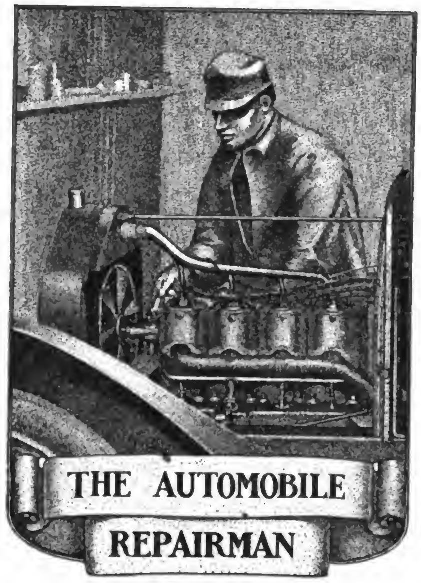


FIG. 2—SOLID BAR STOCK IS REPAIRED THIS WAY

To build furnace take a cast-iron plate I, about 24 inch by 24 inch by 1 inch, and bolt four strong legs J to this base, then build square box of firebrick, as shown, and the trick is done. Now if gas is at hand this is the agent to employ, but if no gas is to be had then use gasoline. This will require another tank and a different type of burner, which can be obtained from any one handling pipe fittings. Very often a repair job of great importance can be done in no other way than brazing, for instance see Fig. 4: A shows a casting broken at B, and after drilling a hole in both parts drive a pin C into this hole tight, as shown at D. Be sure and clean both parts before starting the operation, as we can't braze a dirty, greasy job any more than we can weld in a dirty fire. This will be found to be one of the best paying jobs in the business if care is taken. Then about the cyanide, if a repairman would harden all parts that are apt to wear, before replacing them in auto, he will find it will pay him, as he would gain new customers by so doing.



To Replace Valve Springs.—In case the valves are to be reground it is necessary to remove the springs in order to remove the valves, and many times if the springs are stiff it is quite a job to replace them without a special tool for the purpose. The following kink will be found very useful to the repairer in this case. Place the spring in a vise and squeeze it together until it is as close as is necessary to replace it, and then tie it with stove-pipe wire in about three places. Place the spring over the valve stem and place the lock nuts in place, after which the wires may be clipped with a pair of cutting nippers and the job is complete. J. N. Bagley, Nebraska.

Adjusting, Repairing and Caring for the Automobile—4.

With Special Reference to the Packard Car. The Lubrication System.

Lubrication of a car is more important than any other one thing in its care. Detailed instructions regarding the frequency of oiling the different parts, and the proper kinds of lubricants to use are given in the table.

Motor cylinders, connecting rods, crank-shaft bearings, cam shafts and all parts within the crank case and cylinders are lubricated by splash from the crank case. The oil reservoir is a copper tank on the left side of the motor, between the front and rear pairs of cylinders. This location insures a uniform temperature, and fluid, easily flowing oil even in coldest weather. Within the filler opening on top of the tank is a gauze screen to free the oil from dirt. Passing vertically through the tank, but not connected with it, are two vent pipes from the front and rear crank-case compartments. These are covered with gauze caps. The oil leaves the tank through a pipe in which there is a valve whose handle has three positions. Turned toward the front is complete shut-off. Turned in line with spout, drains the oil tank. Turned toward the rear feeds oil to the oil pump. Always keep this valve handle turned toward the rear when the motor is running.

The oil pump is on the left side of the motor base. It is operated by a worm gear on the exhaust cam shaft, and has two adjustable plungers, feeding oil independently to the front and rear crank case compartments. The inside plunger, or that next to the motor, supplies oil to the forward compartment. There is a packing gland around each plunger, which can be tightened in the rare case of leakage, a small wrench being provided for this purpose. There is a double sight feed on the dashboard. The oil passes through the feeds before reaching the crank case. The glass marked "F" feeds the forward crank case compartment, and the glass marked "R" feeds the rear compartment. These sight feeds afford the operator a constant knowledge of the amount of oil the

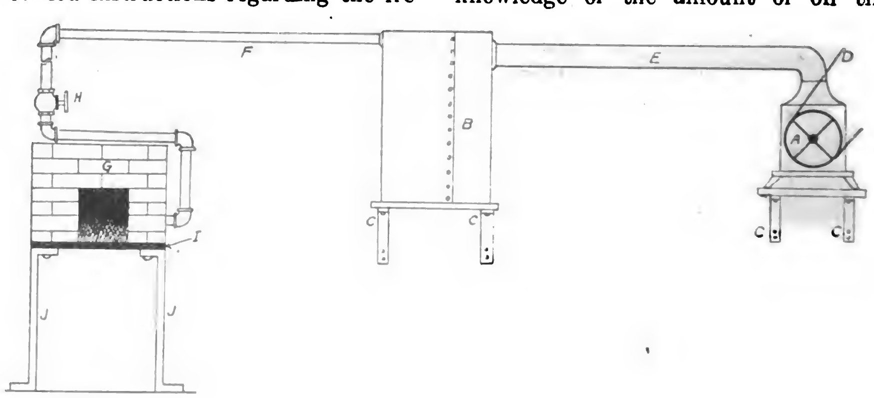


FIG. 3—THE BLOWER, TANK AND FURNACE OUTFIT FOR BRAZING

motor receives when running. The original supply of oil is obtained by pouring oil directly into the crank case. The crank-case vents which project above the oil tank are used for this purpose. The oil in the crank case should be brought up to the level of

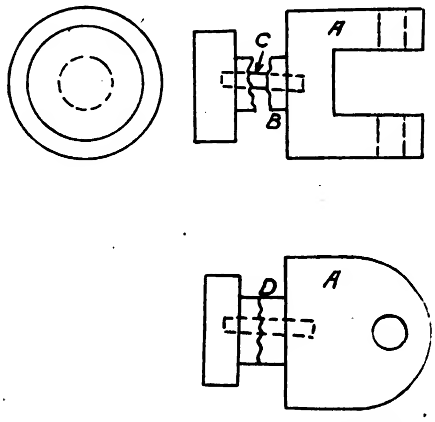


FIG. 4—A REPAIR MADE BY BRAZING

the two pet cocks on the left side of the bottom section of the crank case.

The stroke of each pump plunger is independently adjustable by means of an adjusting screw and check nut at the top. To increase the flow of oil for either compartment, the adjusting screw for that plunger should be turned downward. To decrease the flow of oil, the adjusting screw should be turned upward. After adjusting, be sure that the check nuts are tightened securely. Adjust the pump so that an oil level up to the pet cocks is constantly maintained in the crank case. In the case of the Packard "Thirty," about two drops of oil per plunger stroke will maintain the proper level for ordinary driving. In the Packard "Eighteen," the pump stroke being slower, about three drops per plunger stroke are required. The adjustment may be determined by watching the oil in the sight feeds. For very hard or fast running, the feed should be increased by three or four drops per plunger stroke. Also raise the level by pouring one half pint of cylinder oil directly into each crank case compartment.

Every thousand miles the oil in the crank case should be drained off and a fresh supply poured in. The old oil may be drained by removing the drain plug in the bottom of each compartment of the crank case. If the oil which is drained off is very dirty or heavy, replace the crank case plugs, pour about a quart of kerosene into each crank case compartment and then run the motor rapidly for about a

Every Day Car is in Use, or Every 100 Miles.

Part	Quantity	Kind of Oil or Grease
Oil tank	Fill	Cylinder oil.
Crank case	See that oil is to pet cock level	Cylinder oil.
Clutch shifter bearing grease cup	Two complete turns	Graphite or cup grease.
Steering cross tube grease cups	One complete turn	Graphite or cup grease.
All steering gear connecting rod grease cups	One complete turn	Graphite or cup grease.
Steering knuckle oil cups	Fill (See note A)	Cylinder oil.
Spring bolt grease cups	One complete turn	Graphite or cup grease.
Magneto circuit breaker oil cup	Two drops	Cylinder oil.
Radius rod connections	Thoroughly	Cylinder oil and kerosene.

Every Week, or Every 300 Miles.

Part	Quantity	Kind of Oil or Grease
Starting crank bearing	Eight or ten drops	Cylinder oil.
Fan hub bearing	Eight or ten drops	Cylinder oil.
Commutator oiler	Thoroughly	Cylinder oil.
Commutator grease cup	Three complete turns	Graphite or cup grease.
Change speed and brake lever shaft bearings	Thoroughly	Mixture of cylinder oil and kerosene.
Rear axle outside bearing grease cups	One complete turn	Graphite or cup grease.
Pedal shaft bearings	Thoroughly	Cylinder oil.
Intermediate brake shaft and connections	Thoroughly	Cylinder oil and kerosene.
Steering gear case	Fill (See note B)	Graphite grease.
All brake rod clevices	Thoroughly	Cylinder oil.
External and internal brake fittings and connections	Thoroughly	Cylinder oil.
Hand brake lever racket	Thoroughly	Cylinder oil.
Gear shifter shaft	Thoroughly	Cylinder oil.
Spark and throttle lever joints	Thoroughly	Cylinder oil.
Accelerator joints	Thoroughly	Cylinder oil.
Torsion rod spring and clevices	Thoroughly	Cylinder oil.
Auxiliary air valve stem	Clean thoroughly; do not oil	Gasoline.

Twice a Month, or Every 500 Miles.

Part	Quantity	Kind of Oil or Grease
Front hub caps	Small quantity	Transmission oil.
Magneto bearings	Fill oil cups	Cylinder oil.
Pump and magneto shaft couplings	Thoroughly	Graphite grease.
Spring leaves. (Jack-up frame to separate leaves.)	Thoroughly	Cylinder oil.

Every Month, or Every 1000 Miles.

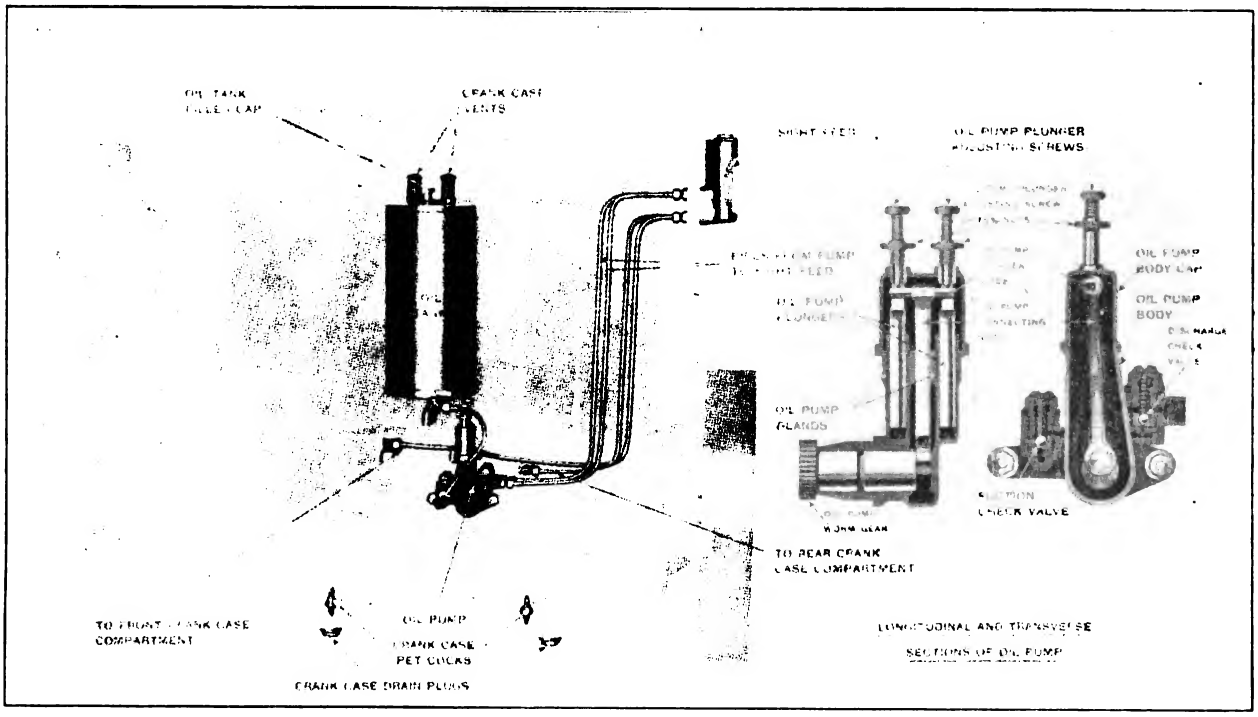
Part	Quantity	Kind of Oil or Grease
Crank case	Drain off dirty oil, flush with kerosene, fill to pet cock level	Cylinder oil.
Motor front gear compartment	Drain thoroughly, flush with kerosene, fill to pet cock level	Timing gear oil.
Front universal joint	Drain thoroughly, flush with kerosene, fill to pet cock level	Transmission oil.
Rear universal joint	Remove grease hole plug at rear end of joint, fill grease gun provided with each car and force in contents	Graphite grease.
Transmission case	Drain thoroughly, flush with kerosene, refill to level of button head screw in front cover	Transmission oil. (Cylinder oil in cold weather.)
Differential housing	Drain thoroughly, flush with kerosene, refill to level of the two brass plugs in the under side of housing	Transmission oil. (Cylinder oil in cold weather.)
Front wheel bearings	Clean thoroughly with kerosene and repack	Graphite grease.

NOTE A—When oiling the steering knuckles be sure that the oil cups are completely filled. Oil flows from these cups through an oil groove into the thrust bearing.

NOTE B—Use the grease gun which is furnished with the car to force lubricant into the steering gear case, through the pipe plug hole provided for the purpose.

Lubrication table giving detailed instructions.

minute. Then remove the plugs and drain off the kerosene thoroughly. Replace the plugs and refill the crank case compartments with oil up to the level of the pet cocks. If, through oversight, the motor does not receive sufficient lubrication and begins to heat or to pound, it should be stopped immediately. Allow the motor to cool. Bring the oil in the crank case compartments up to the pet cock level, and then add an extra pint of oil to the supply in each compartment. Fill the radiator with water after the motor is thoroughly cool. Should there be apparent damage, the motor should be thoroughly inspected without further driving. If no obvious damage has been done, the motor should be given a thorough shop examination at the earliest opportunity to see that the running without oil has not burned the bearings or caused other trouble.



THE MOTOR LUBRICATING SYSTEM OF THE PACKARD CAR

Loss of Power in the Motor Car and Some of the Causes.

J. N. BAGLEY.

A sudden loss of power in a motor car may be due to several causes. Loss of compression will affect the power as quick as any trouble we might mention, and some of the causes of loss of compression might be mentioned—faulty lubrication, leaky or broken valves, broken or stuck rings, broken valve prings or a badly scored cylinder wall. Aside from this we might mention dragging brakes, seized bearing and an improper mixture.

A loss of compression may be readily discovered by turning the motor by hand and noting the manner in which it turns. If after examining the valves and they seem to be in a perfect condition as far as can be ascertained from an off-hand examination without, however, taking the motor down, next proceed to examine the cylinders for lubrication. This can be done by removing the port plugs to see if the walls of the cylinders are dry. In case they are found dry the lubricating device should be carefully examined to find the cause, as a speck of dirt may have stopped the oil, or a cracked or broken oil pipe may be directing the oil to some other channel.

Overheating will cause a loss of power in the motor car, and may be due to any of the following—lack of water or a clogged water pipe, worn or broken pump, insufficient lubrication, improper carburetor adjustments, a very late spark and an over rich mixture will cause overheating in a very short time. Therefore, one of the first things to be learned by the man who wishes to be successful with his car is the relation of the spark to the mixture. This can only be found by experience. A very good plan to tell whether or not the trouble is in the cooling system is to examine the temperature of the water in the radiator. If the temperature of the water is about the same over the radiator it is a very good indication that the circulation is all right, but if the water is much hotter at the top of the radiator than it is at the bottom, look for a clog in the pipes or a worn or broken pump.

One of the most particular points we might mention in regard to power is the adjustment of the carburetor. Many people have an idea that if a little gasoline is good a whole lot is better, and the results are a loss of power and the fuel expense greatly increased.

The carburetor should be adjusted to take just as much air and as little gasoline as possible without, however, having a tendency to skip explosions. The following will be found a correct adjustment for the Shebler Carburetor, and all float-type carburetors will be adjusted along these lines:

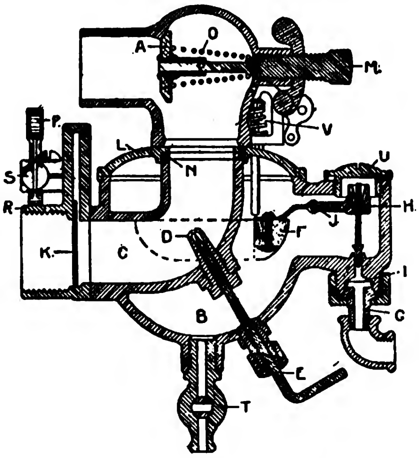
Turning air valve adjusting screw M regulates tension on air valve O until leather valve A seats slightly, but firmly. Turn E to the right until it stops. Then open about one turn and a half. Open the throttle half way, and start engine. Close the throttle, setting it with screw R until engine is running at slowest desired number of revolutions per minute. Now by turning screw E to the right or left the correct mixture at low speed can be obtained. The motor should now run slowly and without missing. The carburetor is now to be adjusted for high

speed. Advance the spark and open throttle one third, observing speed of engine. If engine runs smooth without back firing turn E to the right, which cuts down the gasoline supply. If the engine speeds up this indicates the point of needle E is too blunt and the motor is getting too much gas at this position of the throttle. E now should be unscrewed and needle valve lifted out, and the needle with the next higher pitch substituted and the adjustment for the low speed made in the same manner as before. Now open the throttle one third and turn E again to the right, cutting down the gasoline. If the motor does not increase in speed, but rather is retarded and back fires, the taper of the needle is correct. Of course, turn E back to the left until back firing stops and engine runs at same speed as before. Advance spark and open throttle all the way, which will probably cause the engine to back fire or miss. Turn indicator M until this is eliminated. Carburetor should now be adjusted for all speeds with the most economical use of fuel.

The parts of the carburetor are as follows:

A, compensating chamber; B, float chamber; C, mixing chamber; D, spraying nozzle; E, needle valve; F, float; G, reversible union; H, float valve; I, float connection; J, float hinge; K, throttle; L, cover for float chamber; M, air valve adjusting screw; N, cork gasket; O, air valve spring; P, throttle lever; R, pipe connection; S, throttle stop; T, drain cock; U, float valve cap; V, flushing spring.

As to the spark there is no set rule to use, but it should be advanced as far as possible to get the smoothest running of the car. Many times on a hard pull if the spark is not retarded



A SECTIONAL VIEW OF THE SHEBLER CARBURETOR

to correspond to the speed of the car it will cause pounding, which not only affects power, but causes an unnecessary amount of strain on the crank shaft of the motor, while on the other hand if the spark is too late the engine will not have the required amount of power and will continue to overheat. And, as often times stated by many drivers, experience is the best teacher for the correct relation of the spark to the mixture.

Among what has been mentioned as causing a loss of power we might mention missfiring, as it will affect power to a great extent, and many times stop the motor entirely. Occasionally the missing of one or more cylinders will be noticed during the operation of the engine. In most cases this trouble will be recognized by irregularity of motion, gradually slowing down and, generally, by after firing, or in other words explosions in the muffler.

By running a short time and noting the temperature of the cylinders the missing one may be found, but if this does not prove the faulty cylinder, block the vibrators on the coil and note the sound of the engine, and it can be very easily told. After finding the cylinder examine the spark plug to see whether or not it is at fault. If the plug seems to be in a perfect condition go over the wiring carefully, especially the secondary, if nothing can be found proceed to examine the valves. Possibly a valve is sticking in its guide or a valve spring is broken. Very frequently a missfire is caused by a short circuit, which is commonly known as a ground, this, of course, will prevent the spark jumping at the plug points, and the results are a missfire. Possibly a broken-down coil is at fault, causing internal leaks, this will cause missfiring for a time and finally quit working altogether.

Loose connection of the wire at the binding posts in either the primary or secondary winding will cause missfiring. The looseness may be small or it may be excessive, and the condition in this respect determines the degree of interference in engine operation. Consequently, a loose connection may allow the engine to run from rest to a moderately good speed before trouble begins,

A COMPARISON BETWEEN THE MOTOR TRUCK AND THE ORDINARY HAY RACK

or the vibration of operation may interrupt the contact entirely. We are well aware that a weak battery will prevent sparking at the plug points, and be remedied in no better fashion—providing no extra battery is at hand—than by reducing the space between the points of the plug. While this is not the proper thing to do, a car may be brought home when quite a distance away. In most cases when the missfiring is caused by a weak battery it may be diagnosed by the occasional apparent violence of the explosions on the account of frequent misses. Weak batteries will many times, while the engine is running at low speed, furnish current sufficient to prevent the motor missfiring, while as the engine increases in speed the missing will be quite frequent.

A defective mixture will often cause missfiring on the account of difficulty of igniting. Such a defective mixture may be either so rich it cannot be ignited or it may be so weak it will not ignite. In either case the ignition of the charge is slow, if it occurs at all, and the result is the unburned gas is discharged into the muffler, producing what is known as muffler or after explosions.

A dragging brake will soon heat up the brake drum and use up a great deal of power. It is good practice to jack up the wheel occasionally and see that the brakes do not drag. The brake rods should be so adjusted that the bands both leave the drums at the same time.

In case a bearing has seized it will be found very soon by trying to turn the motor over by hand. If this has happened the chances are that the white metal bearing will have to be replaced. However, this is something that seldom happen to an old motor unless it has been recently taken up. After the bearings of the motor have been readjusted it is well to run a short time and stop and look after them. Use plenty of oil, as oil is many times cheaper than motor cars.

Installation and Repair of Magnetos.

HAROLD WHITING SLAUSON.

A large majority of the modern motor cars are now equipped with magneto ignition, and this applies to the low-priced runabout as well as to the more expensive touring car. Although this form of ignition is an exceedingly satisfactory and reliable system, the magneto is a more or less delicate and complicated instrument, and great care

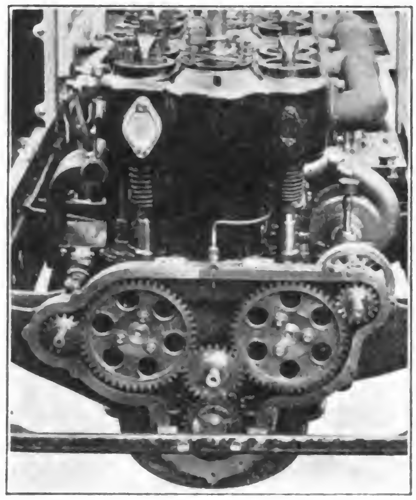


FIG. 1—THE TRAIN OF GEARS IN THE AVERAGE MOTOR

must be taken with any adjustments or replacements of its mechanism. Consequently, it is necessary for every man who has anything to do with the repair of motor cars to understand, to a certain extent, the care and operation of the magneto. This knowledge will be useful to him, even though the magneto is not to be repaired, for parts of the ignition system often have to be interfered with in order to reach certain portions of the motor, and the proper replacement and readjustment of the magneto is of the utmost importance.

Many magnetos are used in place of batteries to generate a low voltage of electricity which shall be raised by means of the ordinary dashboard coil to the proper pressure for the formation of the jump spark. Nearly all of the magnetos with which the new cars are equipped are of the alternating current type, which enables the simplest form of armature and windings to be used. With this type, however, there

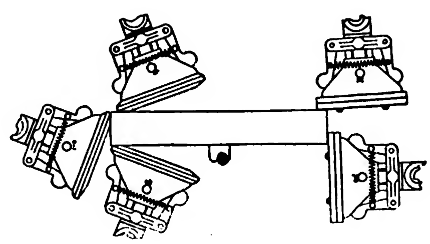


FIG. 2—SOME MAGNETO INSTALLATIONS

are only two positions in each revolution of the armature at which a current will be generated that is sufficient to form a spark. The spark, of course, must occur in the cylinder at the proper part of the stroke, and it is consequently absolutely necessary that the armature be in one of its two current-generating positions when the piston is ready for the ignition of the charge. This means that there must be a constant relation between the position and speed of the magneto armature, the speed of the crank shaft and the location of each piston of the motor. For this reason, magnetos of this type must be geared directly to the crank shaft of the motor, and this gear relation must never be changed.

The magneto on a four-cylinder motor must be geared so that its armature makes the same number of revolutions as the crank shaft of the motor or at twice cam-shaft speed. The magneto of a six-cylinder motor must be geared at one and a half times crank-shaft speed, or so that its armature makes three revolutions for every one made by the cam shaft. The timer and distributer shaft is generally geared to the armature shaft, and consequently the spark is timed by means of the gear between the motor and magneto. The magneto is generally either driven directly by the pump shaft or is geared to one of the cam shafts. In either design its gear forms one of those of the forward train that is exposed when the casing cover is removed, and its lubrication is obtained from the same source.

The accompanying photograph, Fig. 1, shows clearly the arrangement of gears in the front train of a "T"-head motor of the conventional type. As the motor illustrated is of the six-cylinder type, it will be noticed that the magneto gear is but two thirds of the size of the central pinion that is keyed to end of the crank shaft, and thus the magneto is driven at one and a half times the speed of the motor. Although the intermediate gear drives the intake valve cam shaft it acts merely as an idler so far as its effect on the magneto and crank-shaft pinions are concerned and does not change the speed ratio between the two. The cam-shaft gears, of course, are double the size of the crank-shaft pinion, so that they will be driven at one half of the speed of the latter. The pinion at the extreme right is keyed to the shaft of the rotary pump, while the lower gear meshes directly with the crank-shaft pinion and is used for starting the motor with the crank.

It may occasionally be necessary to remove one of the gears of this front train, and if this is the case the greatest care should be taken to make certain that the same relative position between the armature and crank shaft will be resumed when the gears are replaced.

Before any of the gears are loosened, it is well to mark all of the intermeshing teeth with a prick punch so that all gears can be replaced in exactly the same relative position as that which they occupied at first. Even a difference of one tooth between the old and new positions of the magneto and adjoining gear will so throw the motor out of time that it is doubtful if the latter can be made to run at all. Where two gears mesh with the same pinion, care should be taken to designate the separate sides with one and two punch marks, as otherwise the relative positions could sometimes be changed half a turn with no apparent difference resulting until the motor was ready to be started. If the intermediate gear is to be removed and replaced by a new one, as is sometimes necessary when the front train becomes noisy,—a mark should be made on one tooth of each pinion to register with a corresponding line drawn on the inside of the gear case.

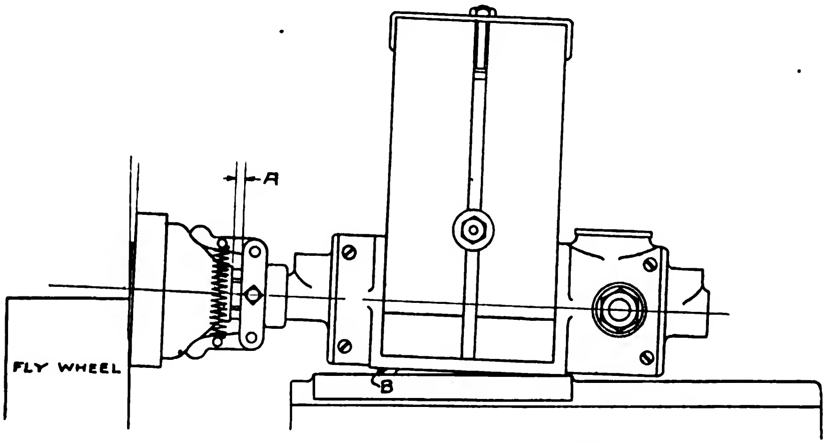


FIG. 3—HOW TO CORRECTLY INSTALL THE MAGNETO

The bearings of the ordinary magneto should not be oiled oftener than once every five hundred miles, and the machine should require but very little additional attention. The timer and distributer should be oiled and cleaned, as has already been described in a previous article, but these could hardly be considered parts of the magneto proper. The platinum contact points of the circuit breaker on the magneto should be cleaned, and if satisfactory results cannot be obtained otherwise it may be necessary to remove the breaker arm and smooth both platinum points with a piece of fine emery cloth.

If the magneto delivers a weak spark when all terminals and connections are bright and smooth, and it is certain that there are no "leaks" in the insulation, it is probable that the fields have lost some of their magnetism or have become "de-magnetized." Although these fields are supposed to be permanent magnets and are made to retain their strength indefinitely, the jars and shocks of continued use will sometimes weaken them to such an extent that the magneto is rendered unfit for use. The strength of the fields can, of course, be tested by placing a piece of steel near the ends and noting the effort required to remove it, but this is not as satisfactory nor as certain a method as is observing the effect of the fields on the armature. This can best be done by removing the driving gear that meshes with the armature pinion and then feeling the resistance offered to the magneto when it is turned by hand. If it turns rather hard through a few degrees, and then, after a certain point has been reached, flies ahead to a new position, it is evident that the fields retain a sufficient amount of magnetism and that the trouble does not lie here. If but little resistance is met with and the armature does not readily respond to the pull of the fields when allowed to assume its natural position, the machine will need to be re-magnetized. In this case, the entire magneto should be returned to the factory, for to attempt to remove the fields from the rest of the machine is a job for an expert only, and the manufacturers undertake to repair only those of their products that have not been dissected by anyone save their own employees.

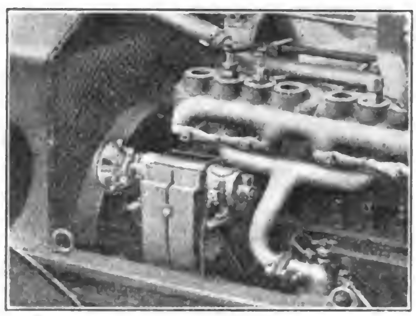


FIG. 4—SOMETIMES THE MAGNETO MUST BE PLACED UPSIDE DOWN

The installation of the ordinary alternating current magneto on a car not previously equipped for the purpose may be a simple matter or it may be an exceedingly difficult proposition, depending upon the design of the motor. If the motor is of the four-cylinder type and is provided with a rotary pump driven by a separate shaft at double the speed of the cam shaft, the installation is the simplest, provided the intake or the exhaust pipes are not in the way. The magneto can be clamped to a special bracket installed by the side of the motor, and it can be connected directly to an extension of the pump shaft without the necessity of any additional gears. If a gear for the magneto must be added to the front train, the installation of the machine becomes a more difficult operation, for it is hardly probable that the forward case will be large enough to accommodate another pinion. In such an

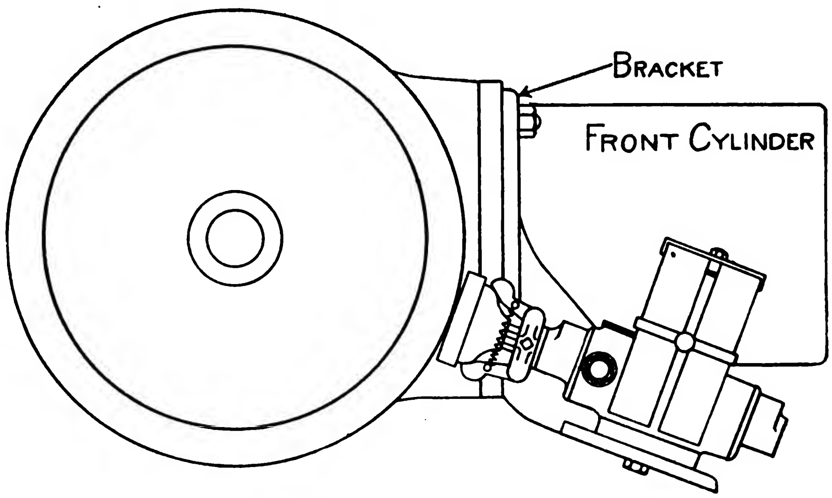


FIG. 5—ANOTHER METHOD OF INSTALLING THE MAGNETO

event, the portion of the aluminum case at which the new gear is to be applied must be sawed off and a new cover, large enough to enclose the additional pinion, must be bolted to the case over the cut-away portion. Difficult as this may seem, it is necessary that the magneto pinion be included in the case with the gears of the front train in order that it may receive its lubrication from the same source, and also that the case may still be kept dust proof.

In many cars, the installation of an alternating current magneto would be such a difficult job that it would be foolhardy to attempt such a rebuilding of the motor as the addition would entail. For such contingencies, however, a special form of magneto is made that does not need to be geared positively to the motor. In order to make this easy attachment possible, the armature of this machine is wound so that a maximum current will be generated during any part of its revolution. Such a magneto is known as the direct-current type, and is so simple that it can be attached to almost any car by a good blacksmith or machinist.

The space under the hood is so often almost entirely filled with the motor and its parts that one of the first problems to be encountered in converting the ignition system of the car will be that of finding sufficient room in which to install the magneto. It may be that sufficient space will be found on one side or the other of the forward cylinder, and in this case a belt-driven magneto may be used. The pulley will have to be keyed to the end of the crank shaft, and it is probable that the location of the clutch that engages with the starting crank will need to be changed. If the lugs of the motor are flat, the magneto may be attached to one of these as a base by means of cap screws extending through holes drilled in the lug. If none of the lugs can be used as a base, a special bracket may be forged and screwed to the engine cylinder between the base and the top. In this case, holes must be drilled and tapped through the outer cylinder wall, and as this portion of the casting is usually very thin, it is probable that the holes will penetrate to the water jacket. Consequently, rubber gaskets must be used between the forged bracket and the cylinder walls to prevent the leakage of any of the jacket water.

The friction-driven magneto possesses many advantages, chief of which is that it does not require the attachment of an extra pulley to the crank shaft of the motor, as it can be run directly by the flywheel. This magneto can be placed in almost any relation with the flywheel, and can be run either parallel with it or at right angles to it. Some four-cylinder motors occupy so much space in the hood that the magneto must be placed upside-down on brackets alongside of the forward cylinder. In other cases, the magneto may be placed low down at the rear of the motor, with its armature shaft at right angles to the crank shaft, and driven by the inside face of the flywheel. If necessary, this type of magneto may even be placed with its armature shaft extending in a vertical direction. It will thus be seen that the friction-driven magneto may offer a solution to the problem of mechanical ignition in old-style cars, and that its adaptability to any make or size of motor renders knowledge of its installation almost necessary on the part of the repair man.

It is but a comparatively simple matter to attach the direct-current magneto to a horizontal motor of the opposed type, for it is seldom that such a power plant occupies the entire vertical distance under the front hood. If the crank case of the motor is covered by a flat plate this will form a good base on which to mount the magneto where it can obtain its power from the flywheel. The crank case plate may be drilled and tapped for the cap screws that are to pass through the base of the magneto, but care should be taken to introduce gaskets between the parts to form an oil-tight joint. Some magnetos are held in place by a strap that passes over the field magnets, but in this case, the method of securing them to their foundation would be practically the same as though a base plate were used. Specially-designed brackets must be used for the magneto mounting on many cars, but it will be an easy matter for the intelligent blacksmith to meet the needs of the case and forge the proper size and shape of support.

The friction disc by which the magneto is driven forms the base of a cone that is mounted on the end of the armature shaft. The substance of which the friction disc is composed is generally some cork or fiber compound that possesses great wearing qualities, as well as a high "co-efficient of friction." The friction material is attached

THE MOTOR CAR CARRIES THE SAFE AND THEN HOISTS IT TO ITS DESTINATION

THE ABERNATHY KIDS AND THE AUTOMOBILE IN WHICH THEY TRAVELED 2,500 MILES

MANY TOWNS AND CITIES HAVE ADOPTED MOTOR-DRIVEN FIRE APPARATUS

THE MOTOR TRUCK AS A HELPER IN PLOWING

by means of a set screw or pin so that the disc may be renewed easily if it becomes unduly worn.

As it is undesirable to drive a direct-current magneto at a high rate of speed, some form of governor is generally provided that will keep the number of revolutions at a certain maximum, regardless of the speed of the motor. It is consequently necessary, when installing a magneto of this type, to allow for the action of the governor and so to set the machine that the normal speed will not be exceeded. One of the most satisfactory forms of governor is shown in the accompanying photographs and drawings. In this type, the cone on which the friction disc is mounted is loose on the armature shaft so that it can move laterally along the shaft, but will turn with it. Two flyball arms, pivoted at one end to a collar that is keyed to the shaft, are held firmly against opposite sides of the cone by a spring. The pressure of these balls against the slanting sides of the cone forces the latter against the flywheel, and the armature will be turned by the resulting friction. As this speed becomes excessive, the flyballs are thrown outward by centrifugal force and the pressure of the pulley against the flywheel is reduced so that slipping between the two will take place.

It is the face, and not the periphery, of the friction pulley that should be placed in contact with the flywheel, although a beveled friction disc can be obtained that will enable the magneto to be placed at almost any angle to the face or rim of the flywheel. The flat-faced friction disc can also be run either from the face or rim of the flywheel of the motor. The different positions for both types are well shown in Fig. 2. In this type of governor it will be noticed that the flyball arms have a greater grip on the cone when the latter is set near the collar than would be the case were a greater space between the two. This space, A, shown in Fig. 2, should be about $\frac{1}{16}$ of an inch when the magneto is first installed, but as the friction disc becomes worn down, or as the spring weakens, this distance will change. When it becomes greater than $\frac{3}{16}$ of an inch the cap screws holding the magneto in place should be loosened and the machine slid in its slot until this distance between the friction cone and collar is set at the proper amount. These figures cannot apply to all cases, for under some conditions, such as a very smooth or greasy flywheel, the pressure between this and the friction disc would need to be greater than is ordinarily the case and the distance between collar and cone should be made less than $\frac{1}{16}$ inch.

The magneto should not be set so that the contact between the face of its friction disc and the surface of the flywheel is perfectly flat, for this position would set up an unnecessary amount of slipping and wear in the former. Fig. 2 shows the proper relation between the friction disc and flywheel, from which it will be seen that the former should set against the latter at an angle. In the view shown, the magneto is set to the side of the flywheel, and consequently the brass disc holding the friction material in place on the cone does not come into contact with the surface of the flywheel,—as might appear to be the case upon a hasty inspection. The magneto is provided with the strip B, cast on the driving end at the base, and this is used to elevate this portion of the machine so that the proper angle between the friction disc and flywheel may be obtained. The effect of this angle is to give a rolling motion to the friction, as this becomes a very flat cone which revolves freely without grinding or undue wear of the surfaces.

As the magneto practically replaces a set of batteries, the wiring is simple and the connections are made with

A MOTOR TRUCK LOADED WITH GRAIN

the coil and switch in about the same manner as though dry cells were used. The machine should not require any attention except the application of a few drops of oil to the bearings every four or five days, and the occasional cleaning of the commutator and brushes. Neither the armature nor the fields should ever be removed, as this will cause a loss of magnetism that will render the magneto useless until the fields can be recharged.

Making Dry-Cell Battery Connections.

FRANK N. BLAKE.

In Motor.

The use of spring clips on battery connectors is not nearly as common as it ought to be, considering the merits of that method of connecting the cells as compared with the more common use of the familiar little brass nuts. The strongest argument in favor of the spring clip is that there are no mysterious or annoying stoppages of the motor from nuts jarring loose and causing a partial or total interruption of the current. Instead of this the jarring of the car tends to keep the contacts in the best possible order by wearing the parts bright, while the spring is ever on the alert to take up all slack and maintain a clean metal-to-metal contact, so, instead of the jar being detrimental to good service, it is positively beneficial.

The convenience of spring connections commends itself to everyone who has had experience with the frequent manipulation of from 18 to 34 or more nuts, some in vertical and others in horizontal positions, and all of them down in a box which is often located in a place which is both dark and difficult of access. With so many nuts to deal with it is not to be wondered at that one or more is often not made up tight enough to give good contact and resist the tendency to shake loose in service.

Another trouble attendant upon the use of nuts and ordinary wire connectors is that the wires are prone to break, especially at the ends, where they have been subjected to both bending and flattening by pinching; while, with the multiple strand cables used in spring clip connectors, there is almost complete immunity from breakage. Then, again, in our efforts to make a good, permanent connection, we sometimes overdo it, and twist off a brass post which may not have been soldered on in the best shape or which may have been accidentally weakened by a blow or by corrosion. The spring connections commend themselves particularly to the wise motorists who use cells connected in series-multiple, and are thereby enabled to use them when almost completely exhausted, if tested occasionally and dead cells replaced by active ones.

The advantages of connecting cells in series-multiple are not generally appreciated. Aside from enabling one to use them until their ampereage is reduced to ½, ⅓ or ¼, that at which they would otherwise have to be discarded (depending upon whether 2, 3 or 4 sets are used), the slower rate of discharge per unit seems to be favorable to longer life; resulting, according to a large manufacturer of cells, in net mileage gains of about 43%, 50% and 53% in using 2, 3 and 4 sets of cells. One advantage in using series-multiple connection is that one of the intermediate connections may be broken without stopping the motor. However, this is not liable to occur with spring-clipped connections. The disadvantage of this method is the lack of a reserve battery to fall back upon, if the one in use fails. But, with occasional testing this trouble is avoided.

Reference to testing reminds us of the desirability of using only a dead beat ammeter for this purpose. Testing a battery with an ammeter has been compared to turning a pail of water over to find how much there is in it; and, while the ammeter is not quite so wasteful as that statement would imply, it is still an apt, though exaggerated, comparison. The way some men test cells with some ammeters must delight the hearts of battery makers and sellers—they hold the instrument on the poles for several seconds until its swinging needle finally comes to rest, and sometimes even longer, the current meanwhile flowing unrestrictedly. The better way is to use a dead beat ammeter (the needle of which stops at once on the reading, instead of swinging back and forth several times before coming to rest), making a firm but very brief contact, and instantly noting the reading. Usually it is not necessary to obtain a very exact reading. If one is sure that the cell tests high enough for the particular service, that is enough. Even with an ammeter having an oscillating needle, the user can get what information he actually needs with a much shorter contact than is usually given. Incidentally, it is a good plan to place the rigid ammeter pole on one pole of the cell and its flexible terminal on the corresponding pole of the next cell, since this tests not only the cell but the connections.

The connections with the primary posts of the spark coil should be of some spring variety, not only for the reasons which apply to cell connections, but also in order to facilitate periodically reversing the direction of current through the coil for the better preservation of the platinum contacts and to save the trouble and waste incident to filing away a metal more costly than gold.

There are a number of spring

THE AUTOMOBILE AS AN AID TO THE FARMER WHEN INSPECTING STOCK AT DISTANT POINTS

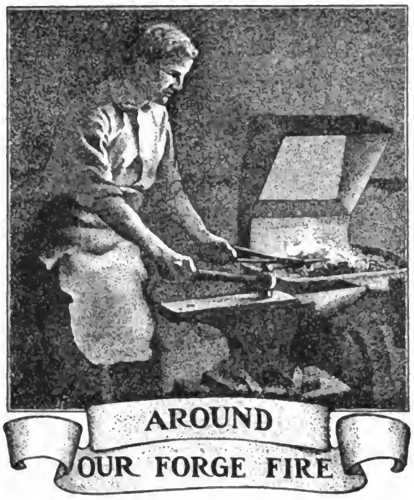
connectors made, and may the motor-car driver get a set which will free him from much of the trouble heretofore experienced. Troubles enough will arise if we do away with all that are preventable.

Does Power Pay?

PAUL V. BURGESS.

This is the question that a great many smiths are asking themselves every day. To any one who is considering the subject, let me say, don't for one moment doubt but that it pays, and also relieves you of much of the hard work. The first thought that will come to you is: "What kind of power is best suited to my needs?" The one and only power, to my way of thinking, is the gasoline engine. There is so much argument in favor of the gasoline engine that I hardly think it worth while to enter into a discussion of its merits. However, I will try to give a few of the leading points in its favor according to my views. When you have a gasoline engine in your shop, you are independent of all outside conditions so far as power is concerned. If you depend on electrical power, a breakdown at the power house may put you out of business for several days. If you depend on steam, you must have coal and water and an extra man. But with a gasoline engine you just go about your own affairs with nothing to bother you. As to the reliability of the gasoline engine, we believe it to be the most dependable power there is. We have no trouble with ours now, although when we first began with it we had some little bother, principally because we did not understand the igniting part of it as well as we should have. But now we never have any trouble with it. We have been running it for six years and have not been out but about fifty cents for repairs and have never had a breakdown, and the engine is just as good as new. In fact, it uses less fuel now than when it was new.

But after all the most vital question is: "Does it pay?" Believe me, it does. You will never know the difference in doing all your work by hand and then doing the same work with power until you have tried both. And you do not need so many different machines after all. Just a few if you get the right ones. As I expect to take up this part of the subject at another time I will not dwell on it now. Just a word about the size engine to buy. Do not buy less than a six-horsepower. A six-horsepower will pull your shop on less fuel than a three-horse, and will not give you nearly as much trouble. To get the best results you must have at least thirty per cent surplus power. The engine will cost you a little more, but it is money well spent.



Finding the Editor busy at his "forge," Benton closed the door quietly, appropriated one of the Editor's good cigars and proceeded to look over the proofs of the current number. After looking through several pages he exclaimed: "Thought the April number was going to be horseshoeing!"

"So it was," said the Editor, without looking up.

"Do you know that it isn't?" asked Benton, somewhat sharply.

"I had an idea that it is not," said the Editor, looking up. "But if you'll just amuse yourself for a minute or two I'll explain," and the Editor bent over his "forge" to again busy himself with his task.

Benton, somewhat abashed, puffed fiercely at his cigar and appeared to bury his nose deeper than ever in the pages of his paper.

"Now, Benton," said the Editor pleasantly, after dispatching the "kid" with a huge bundle of proofs. "I've got a chance to chat with you. We did plan to make the April number a horseshoeing number, but for several reasons we have thought best to just switch the two issues, making April the automobile number and May the horseshoeing number. You see, the automobile season begins earlier every year, and then, too, the May number will see an entire new series of type in the paper, and it would be more appropriate to usher in the new page dress with a horseshoeing issue. So you will see a horseshoeing number in May."

"Well, that is satisfactory. What about this new type for May?"

"Well, for some time we've been wanting to change the general appearance of our pages. We've been running along about the same lines for some little time now. After experimenting and considerable looking around, we have at last hit upon a type style and a page arrangement that will, I think, be very good."

"How do you—" but before Benton could finish, Sam Clinton came in.

"Say, Benton," exclaimed the newcomer, "I want to put a nice polish on some handles I'm making for one of my customers. How can I do it?"

"It's a very simple job, Sam. I don't remember just exactly how it is done, but I'll look it up," and Benton brought out his receipt book, and, after looking through several pages, he continued. "Here it is now, I guess this will just suit your purpose. Take a quarter of an ounce each of shellac and of resin and dissolve in a half pint of alcohol. After dissolving, add a half pint of linseed oil and shake the whole mixture well. Apply with a flannel cloth or sponge and rub well after applying."

"That's simple and it sounds as though it would work well," and with a hearty "thank you" to Benton and a nod to the Editor, Clinton went back to his shop.

ANOTHER JOB WHICH THE FARM MOTOR TRUCK HANDLES

Village Blacksmith.

Under a costly canopy
The village blacksmith sits;
Before him is a touring car
Broken to little bits—
And the owner, and the chauffeur, too.
Have almost lost their wits.

The village blacksmith smiles with glee
As he lights his fat cigar—
He tells his helpers what to do
To straighten up the car—
And the owner, and the chauffeur, too,
Stand humbly where they are.

The village blacksmith puffs his weed
And smiles a smile of cheer
The while his helpers pump the tires
And monkey with the gear—
And the owner, and the chauffeur, too,
Stand reverently near.

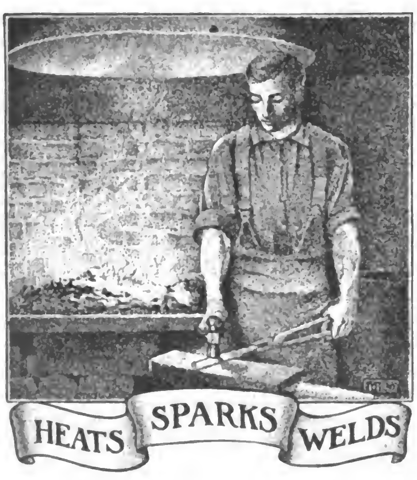
Behind the village blacksmith is
The portal of his shop;
The shop is very large in size,
With a tiled roof on top—
And the owner, and the chauffeur, too,
At it were glad to stop.

The children, going home from school,
Look in at the open door;
They like to see him make his bills
And hear the owners roar—
And the chauffeurs weep as they declare
They ne'er paid that before.

He goes each morning to the bank
And salts away his cash.
A high silk hat and long frock coat
Help him to cut a dash—
But the owner, and the chauffeur, too,
Their teeth all vainly gnash.

The chestnut tree long since has died,
The smith does not repine;
His humble shop has grown into
A building big and fine—
And it bears "Garage" above the door
On a large electric sign.

Chicago Evening Post.



What do you think of cold tire setting now?

Strange—a man wants his horse to have a fine coat, but no "pants."

The dreams of the worker are the dreams that come true—not so the dreams of the dreamer.

If you sell farming implements cultivate the farmer's acquaintance and help him cultivate.

It's not so much what a man hears that counts for or against him as what he tells or does not tell .

Mistakes cost money, no matter where or how made. This is especially true of mistakes in smithing.

What's the matter with getting that whitewash brush to flopping now? It's never too late to whitewash.

Uncle Billy Martin says: "Ef y' don't know what ter expect, jes' live right and wait. Y' won't be in ignerance long."

They say "All things come to him who waits," but how about the smith without any trade and located opposite a prosperous neighbor?

Some men think they are blacksmiths when they get so they can make the sparks from a piece of hot stock fly like a Fourth of July celebration.

Are you getting all the profit you figure on? Perhaps you know and then again perhaps you don't know. A good system of accounting will tell you beyond doubt.

If you can devote time to side lines, keep your eyes open to new opportunities. Follow the path of the city department stores, handle new and improved goods, machines and implements.

You enjoy and profit by what others write in our columns. Why not tell others of your experiences? Your brother readers will enjoy your items—send something of interest to the Editor and let your brother craftsmen know that you are a live smith.

Have you asked your jobber about AMERICAN BLACKSMITH Subscription Coupons? If not, ask him today. Find out about our very simple, time-saving subscription system. If your jobber doesn't handle AMERICAN BLACKSMITH Subscription Coupons, tell him to get them.

When Thomas comes home for a meal,
He kicks to his wife a good deal;
He finds fault with the food,
But it's often too good
For a man with a continuous squeal.

It's not the man who only undersells you who is your worst competitor. Nor is it the man who only underbuys you. The man to fear is the man who uses brains, energy and system and keeps things moving all the time. The man who keeps his business eyes riveted on his business every minute of every business day is the only real competitor.

Again we are compelled to call the attention of "Our Folks" to the fact that there are a number of fake subscription solicitors abroad in the land. Of course, we want you to be careful. Give them a wide berth, and when in doubt about any solicitor send your order in direct. With our Subscription Coupons being handled by jobbing house salesmen, there is little excuse for being "taken in" by a faker. Subscribe through your jobber or his salesman, and save yourself time and trouble.

Here's a little item from a California newspaper that should interest every smith located in an unorganized county:

"The blacksmiths are warring down at Delano. Some time ago they got together and signed an agreement to increase the price of horse shoeing to $2 per head, explaining to the public that it was impossible under the present conditions to do it for less. Someone broke the agreement and now they are shoeing for $1 per head or less. The public is puzzled to know how they can afford to do work in times of war for one half the price charged in times of peace."

How's this for a blacksmith's creed:

1. I believe in the work I am doing.
2. I believe that honest work can be done for honest people, and paid for at honest rates.
3. I believe in working not waiting; in laughing not crying; in boosting not knocking, and in the pleasure of doing business honestly.
4. I believe in courtesy, in kindness, in good cheer, in friendship, in honest competition, in generosity and, above all, in honesty.
5. I believe in increasing my trade, and the way to do it is to go after it. I am after your trade.

Why not print it on your business cards, letter-heads and post it in the shop?

The plan of Stable Inspection, originated by the Boston Work Horse Parade Association, has proved extremely successful. Every fall and winter the Association offers to inspect, free of cost, any stable that may be entered for the purpose, and the stables so entered are visited, and all the details of feeding, watering, bedding, grooming, blanketing, etc., are carefully investigated by experts. A confidential report is then made to the stable proprietor, defects are pointed out and suggestions are made. In most cases the stables are inspected two or three times, and at the annual Memorial Day Parade silver medals and other prizes are awarded, if deserved, to the owners of the horses, to foremen and to nightmen. Prizes are also awarded to the stables making the greatest improvement.

Many of the largest horse-owning corporations in the city have availed themselves of the inspection, and this year at least 3,000 horses will be inspected in the various stables entered. The Association has found that horse owners are almost always glad to adopt the suggestions made to them, and in some cases the expert inspectors have met the grooms and drivers, at the request of the employer, and have explained to them the necessity for certain improvements in the treatment of the horses. In one case a leading truckman gave a dinner at a hotel to his drivers in order that the President of the Work Horse Parade Association and the judge who inspected his stable might have an opportunity to meet them. The fact is that horse owners might prevent much unnecessary wear and tear of valuable horse flesh, to say nothing of humanity, by cultivating a proper spirit among their employees.

Moreover, the experience of the Boston Association has been—and no doubt the same thing would be observed everywhere—that in most stables the comfort of the horse can be promoted and his working days prolonged by making improvements in feeding, watering, bedding or grooming, the cost of which is comparatively slight.

Our Honor Roll.

Below we give a list of subscribers of The American Blacksmith who have paid their subscriptions farthest in advance. This list will be corrected from time to time as other subscribers take advantage of our special long-time rates. If your name is not on Our Honor Roll take advantage of our special long-time rates.

The regular subscription price of The American Blacksmith is one dollar per year in the United States and Mexico, and one and a half dollars, or six shillings, per year in Canada and other countries. Our special long-time rates are as follows:

	U. S. and Mexico.	Canada	Other Countries.
Two years	$1.60	$2.40	10 shillings.
Three years	2.00	3.40	14 shillings.
Four years	2.50	4.35	18 shillings.
Five years	3.00	4.90	1 Pound.

R. S. Crisler, Kentucky........Jan., 1920.
T. P. Considine, Massachusetts. Dec., 1918.
Richard Brenner, Texas.......Feb., 1918.
C. J. Hall, Washington........Dec., 1916.
George Howard, Kansas.....March, 1916.
C. R. Winget, Vermont......March, 1916.
M. Klitgord, New York........Jan., 1916.
O. Stenning, South Dakota....Jan., 1916.
Iver Johnson Arms and Cycle Works, Massachusetts.......Jan., 1916.
Feldmeyer & Schaake, Kansas..Jan., 1916.
Jas. A. Sharp, Massachusetts....Dec., 1915.
J. Krahulec, Illinois...........Dec., 1915.
P. E. Dahlfurst, California.....Dec., 1915.
Wm. Bisher, Ohio............Dec., 1915.
C. A. Jerner, Nebraska........Dec., 1915.
G. S. Fisher, Nebraska........Dec., 1915.
Printers Supply Company, Nebraska.................Dec., 1915.
M. Kennedy, Tasmania.......Dec., 1915.
Williams & Turner, West Virginia...................Dec., 1915.
C. J. Ash, Kansas............Dec., 1915.
F. H. Joslin, Massachusetts....Dec., 1915.
C. W. Ames, Massachusetts.....Dec., 1915.
C. L. Sorensen, Nebraska......Dec., 1915.
E. Williams, New York.......Dec., 1915.
D. Codere, Illinois............Nov., 1915.
F. S. Woody, Iowa...........Nov., 1915.
George H. Ilsley, Massachusetts. Nov., 1915.
M. I. Huff, Missouri..........Nov., 1915.
Stephen Wachter, Pennsylvania. Nov., 1915.
C. C. Perry, Australia..........Oct., 1915.
Sidney Stevens Imp. Company, Utah......................Oct., 1915.
W. H. Findlay, New Zealand....Oct., 1915.
R. F. Watson, California......Oct., 1915.
H. R. Stone, Connecticut......Oct., 1915.
F. Teuber, Georgia............Oct., 1915
Ed. Hammill, California......Sept., 1915.
R. D. Simkins, Pennsylvania-..Sept., 1915.
T. J. Reynolds, Pennsylvania..Sept., 1915.
Wm. Bates, Texas.... ......Sept., 1915.
J. Knight, England..........Sept., 1915.
A. Chargois, Queensland, Aus...Aug., 1915.
A. M. Byfield, West Australia..Aug. 1915.
C. E. Allen, Nebraska........Aug., 1915.
M. J. Roder, Montana........Aug., 1915.
J. E. Lyon, Texas............Aug., 1915.
F. W. Krenz, California.......Aug., 1915.
Jos. P. Rotolinski, Massachusetts. Aug., 1915.
Jas. A. Buchner, Michigan......July, 1915.
G. N. Ferree, Utah............July, 1915.
T. O. Chittenden, New Zealand..July, 1915.
The Goldfields Diamond Drilling Company, Australia........July, 1915.
J. A. Lawton & Sons, South Australia.................. July, 1915.
I. Murray, South Australia....July, 1915.
J. W. Ivil, Utah..............June, 1915.
E. L. Herving, Florida........June, 1915.
E. E. Mercer, Kansas..........May, 1915.
A. E. Spangbery, Oregon......May, 1915.
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W. Whitbread, South Australia. April, 1915.
J. L. Steelman, Washington....April, 1915.
R. E. Pethrick, Pennsylvania..April, 1915.
Wm. McCurdy, Oregon.......April, 1915.
Chas. Schmidt, South Dakota..April, 1915.
Arthur Seewald, Illinois......April, 1915.
T. E. Birchmore, Georgia....March, 1915.
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Jos. Hiemenz, Minnesota....March, 1915.
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Wm. P. Schrink, Montana....March, 1915.
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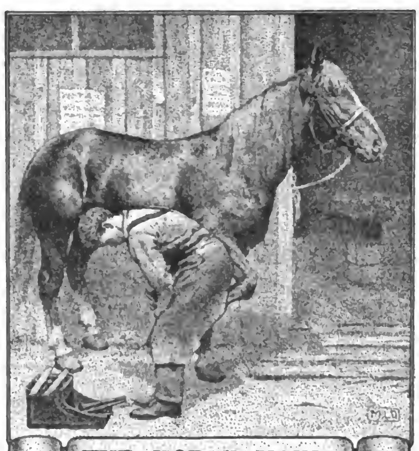
F. Townsend, New Jersey....March, 1915.
C. D. Camp, New York......March, 1915.
A. Thalmann, Tennessee.....March, 1915.
J. J. Purinton, Ohio.........March, 1915.
W. H. Leonhard, Pennsylvania. March, 1915.
W. A. Shive, Pennsylvania....March, 1915.
R. L. Killingsworth, Texas....March, 1915.
Van den Wildenberg Brothers, Wisconsin................ March, 1915.
V. Priessnitz, Wisconsin...... March, 1915.
F. J. Ties, Wisconsin........March, 1915.
J. Marshall, Indiana........March, 1915.
H. D. King, New Jersey......March, 1915.
W. E. Bedford, North West Territory..................March, 1915.
G. H. Longley, Massachusetts..Feb., 1915.
H. N. Seeley, New York.......Feb., 1915.
J. A. McGaughey, Washington..Feb., 1915.
A. E. Roesner, West Australia..Jan., 1915.
Alf. Seidel, Nebraska..........Jan., 1915.
Brown & Peterson, North Dakota. Jan., 1915.
H. F. Schreiber, Pennsylvania..Jan., 1915.
A. C. Elder, Georgia..........Jan., 1915.


THE HORSESHOER

Some Don'ts in Colt Training.

PROF. JESSE BEERY.

Never break his spirit by long, wearisome drives, when he becomes so weary that his mind becomes dulled and sees, but does not observe, and the same objects later, when seen with fresh eyes, become the cause of a runaway.

The words "breaking colts" have become obnoxious to me, for I have seen too many well-bred, high-spirited colts broken in spirit and strength by some of the old-time methods of "breaking". A colt should be trained when his brain and body are alert. The training should not be a subordinate part of some other work. The future usefulness of the colt should be of sufficient value to make the lesson the only thing on hand at the time. Many colts are unnecessarily confused because the trainer was thinking more of the stone to be loaded on the drag or of the errand he had to do when he reached his destination.

When colt training is done as it should be, eight or ten half-hour lessons given in systematic order will accomplish more and put a colt in condition to stand more severe tests than the haphazard, go-as-you-please methods now commonly practiced can do in two years.

The trainer should put his whole mind on the work at hand, and strive to keep the attention of the colt, that he may get the idea of what is expected of him. As soon as he gets the idea, repeat always in the same way until he understands his lessons thoroughly. No one can do this correctly until he has his mind on his work, and perseveres until he has gained the end sought. Whoever does this will find that he has enough to keep him busy without any other matter on hand.

There are several reasons why it is not good policy to train a colt by hitching it by the side of an old horse. The old horse is slow in starting, and plodding in motion, probably, while the young one is impetuous and lively. Soon the young horse, if it be very ambitious, becomes confused when the old one holds it back, and this confusion ends in balking.

If the old horse starts before the colt, this leaves your lines slack and gives an opportunity for the colt to leap forward, and soon the habit of bolting is formed, and the pleasure of a good, steady driver forever vanishes.

There are very few old horses that are so free from bad habits that you would desire a colt to be just exactly like them. Whatever their peculiarities may be, they will be learned by the colt if compelled to endure the same conditions.

I try to make it plain that horses do not reason, and that their acquirements cannot be explained by themselves to their own kind. If they could do so we would have no colt training to do. The colt's mother would do all that for us. Since the old horse can in no way explain to the colt what it ought to do, the old horse simply

serves as so much dead weight to prevent the colt getting away, either sideways or forward, and becomes only a power to assist the colt to move forward if it does not desire to do so.

Rather than have the colt lunge against so much dead weight, how much better it would be to let the colt come up against the bit controlled by the sensitive hand of a man who knows just how much he should pull and when to give more freedom. It only takes a few moments in a small lot where the colt cannot get away from you to teach it that it must submit to the controlling power of the bit, so there is no danger of the colt requiring more than man's strength to control it.

When trained at the side of an old horse, the first intimation that the colt gets that it should stop is when it feels the dead weight of the old one fastened to the bit sawing through its mouth, and that is a rather severe way of learning. It is usually thought that the man can handle the old horse, and let the old horse keep the colt in place. For my part I prefer not to have an old horse as a sort of an interpreter, but prefer to handle the colt directly through my own sense of feeling.

When a colt is trained alone, you have more of its attention than can be had otherwise. There should be nothing to divert his attention. Every attempt should be made to impress upon his mind that a certain signal means a certain action, and not allow that action to become confused with another signal. A very common mistake is to attempt to train a horse to do too many things at a time. No horse, and but few people, can comprehend more than one thing at a time.

In some parts of the country it is a common thing to see a colt have the harness thrown on him, and then dragged and whipped up to the side of a wagon pole, hitched up and driven several miles, during which time the commands "Whoa" and Get-up" were given and, besides, it was expected to turn to the right or left upon the slight pull of the bit against the opposite side of the mouth. It was expected to learn the six or seven different signals given it, all in one lesson. Whatever you may have expected, rest assured that it did not learn more than one signal, if any at all.

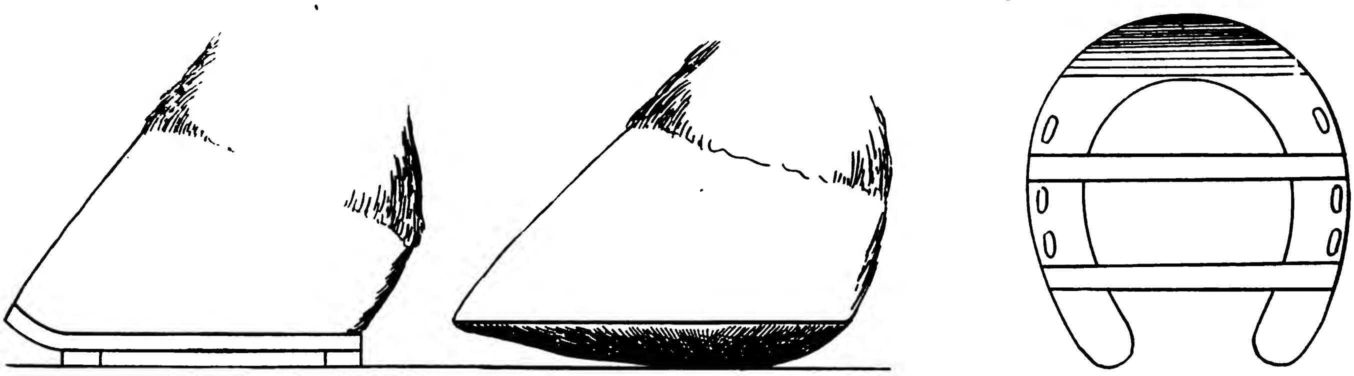
If my many years of experience taught me anything at all it is this fact: a horse can get but one idea at a time. An idea may be more simple than is commonly expected. It is one thing for a colt to get the idea that "Get-up" means to go, and another thing to learn that "Whoa" means to stand. Each of these commands should be taught separately, and so thoroughly drilled into the colt that whatever accident might happen, the word "Whoa" would be associated with the act of standing, and that, STAND IT MUST.

These commands should be taught and can be taught more easily and comprehendingly before attempting to hitch the horse. Although the double lines are fast taking the place of the "lead horse" with the single line, some farmers prefer the single line. The aim is to teach the horse to respond to the words "Gee" and "Haw" or some such term, to have the horse step to right or left. Instead of taking the horse to the field and hitching to the plow with another horse tied to the leader the work would be made more effective and pleasant if the lessons were given in a small enclosure, and each command thoroughly drilled separately. The teaching of the command is sufficient to keep either horse or man busy without anything else on hand.

Some time ago my attention was attracted to a man plowing potatoes with a one-horse cultivator. All other horses being busy he was using his driving horse. Both were having a hard time of it, the horse being accustomed to long strides gave the man all he could do to keep up. It knew nothing of the commands and had to be guided by pulls on the lines, which often became severe jerks. The man was throwing his weight against the horse's mouth to keep it slow enough. He was particular how his potatoes were plowed, and the awkwardness of the horse often caused him to plow too near the row or to plow too deep. This was the cause of the angry jerks on the lines. It is useless to say this continued the greater part of the summer before the horse became anywhere near being a pleasant horse to plow potatoes with.

Plowing potatoes is enough, without training a colt at the same time. This young horse should have been taken to a small lot or enclosure, and in half an hour trained one command; the next day it should have learned another command in the same length of time. In three lessons of a half hour each the horse could have been taught to step to right or left and to walk slowly. This can only be done by the man giving the horse his undivided attention and receiving the attention of the horse, and neither man nor horse would have lost their tempers, and all the remaining season the work would have been done with pleasure to both.

It is disgusting to any one looking on to see a man lose his temper with a horse that is doing just what his master taught him, by giving signals that varied frequently in kind, and never clearly taught. I have frequently heard three or four different terms used for the same thing, and also have heard the same term used for three or four different ideas. The horse could do nothing else but have vague ideas of the commands used, and would always have the name of a disobedient, sluggish or stubborn horse, and only because the trainer had been careless and



THREE STYLES OF SHOES TO RELIEVE A STIFF JOINT

indifferent in his manner of training.

In conclusion, I wish to say that much time can be saved by knowing what end you want to gain, and going directly to it with the least hindrance possible. What you train your horse to do, train him well, and it will never have to be repeated. Keep your mind clear and temper cool. An irritable man produces an irritable horse.

A Special Shoe For A Stiff Joint.

LESTER M. SIMS.

I notice in the February number, a Mr. McCormack, of Massachusetts, wants a special shoe for a stiff pastern joint in a front foot. I will offer three patterns all of different designs, but calculated to produce about the same results in such a case, and hope he will find in them one suited to his subject. These three shoes may be found equally good, but only under conditions suited to each of them. It is, therefore, not only a question of shoe, but the kind of footing over which this particular subject is to travel in deciding which shoe is really to be adopted, and naturally enough this one point is always to be regarded in designing to shoe a horse.

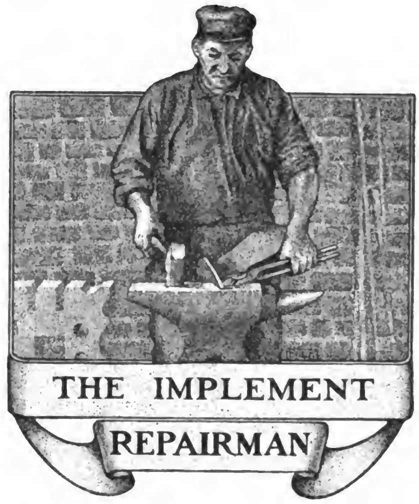
The first shoe to be mentioned is known as a ball or center bearing shoe. It virtually adds another socket or joint to the limb, because of its bearing surface on the ground, and will afford much ease and comfort either in motion or at rest to such a subject. This shoe is intended to be truly a center bearing shoe, and after being nailed on should not rock or tilt in any way, as it is then truly a center bearing, causing an even rotation of the column of bones above, and thereby relieving all tendons and ligaments of any tension or strain. The shoe is to be made of about 3/16-inch plate steel. First dress the foot, then cut a paper pattern, lay it over steel, mark and cut out the solid plate, punch and hot rasp until it is a fit and finally take a heat and hammer until it is a ball shoe. Usually one who has never made the shoe will find it a little difficult to locate the center bearing. Now, I am sorry that I am compelled to say that this is not a good shoe in mud on account of slipping.

The next is the four-calk rolling shoe. To make it take a common light machine shoe, turn the heel calks and weld on the two front calks.

The next is known as the Memphis Bar Shoe. To make it you may use a machine shoe, by first fitting a common flat shoe to the foot, and then welding the two bars across (bars may be of half-inch square for small feet). I may add that the size of the calks or bars to be used and their adjustment are to be governed and modified according to the size of the foot and conditions of our subject. The front bar or calks are to be kept well back from the toe. In finishing either of these shoes, take a heat and trim the toe of the shoe off, then roll it to a thin edge (if the foot will stand to be rolled off at the toe do so with rasp), and turn up the shoe. The object of all this is to prevent, as much as possible, having the toe come into contact with the ground, as the foot rolls or breaks over. Good results may be expected of any one of these shoes.

Judgment is of course necessary in the application of any of these shoes. No one particular shoe of these three is designed to meet the needs of all cases of stiff pastern joint. Common sense and experience will tell the practical shoer which shoe is best for his particular case. Each will generally be successful under conditions peculiar to it.

MR. D. O. SHIELDS, OF CALIFORNIA, RUNS A GENERAL SHOP AND AN IMPLEMENT AGENCY



Gun and Novelty Repairing—17.

W. G. MUMMA.

Cement for leather belts: soak over night a pound of good fish glue in a pint of cold water, heat this up, then add one ounce of dry white lead, then mix thoroughly and when nearly cool add one ounce of grain alcohol and stir it well. When ready for use, heat it up, have the laps smoothly and freshly made, and as clean as possible. Spread the cement with the brush over the surfaces and quickly place together with a warm board on each side, then clamp up tight. This cement can be cut up, put in jar with a tight cover, and kept in a good condition for some time. Use only what is wanted for each job.

To harden steel without scaling: when articles are made of tool steel with a polished surface they can be hardened without forming a scale and destroying the polish by dipping the articles to be hardened first into water, then dip into equal parts in bulk of fine corn meal and common salt. Then place carefully into the fire. When hot enough to melt the mixture, take from the fire and again dip or roll in the mixture and again place in the fire, and bring to the required heat for hardening. If any dry spots show on the piece sprinkle some more of the mixture on it. This mixture when heated forms a flux on the surface of the steel which prevents scale from forming, leaving the surface the same as before heating.

A waterproof cement for glass: take eight parts of dry whiting, one part red lead, one part litharge, stir these together and mix as wanted for use with

pure linseed oil thick enough for a stiff putty; let dry a week.

Iron cement: mix equal parts of sulphur and white lead with about one sixth part of borax and mix the three together thoroughly. When ready to use, wet the mixture with strong sulphuric acid, then spread a thin coat of the mixture on the joint to be united, clamp, and after five days the joint will be sound and dry.

To blacken tin for marking out patterns take a sheet of tin plate and rub on with a piece of waste dipped in a solution of: fifty parts of water, one part oil of vitriol, one part blue stone. Rub the tin, using plenty of the solution on the waste, and soon you will see spots of brass, then copper, and lastly a dark gray, nearly black. Then wipe dry, when it is ready for use to mark the patterns.

As a lubricant for lathe centers use chalk to prevent squeaking and cutting.

A lubricant for lathe centers: take white lead mixed with sperm oil, with enough graphite added to give a dark lead color. Keep in small tin boxes and add oil to keep it from getting too thick.

To fasten labels on iron or steel, rub the surface with an onion cut in half, then apply the label with glue or paste.

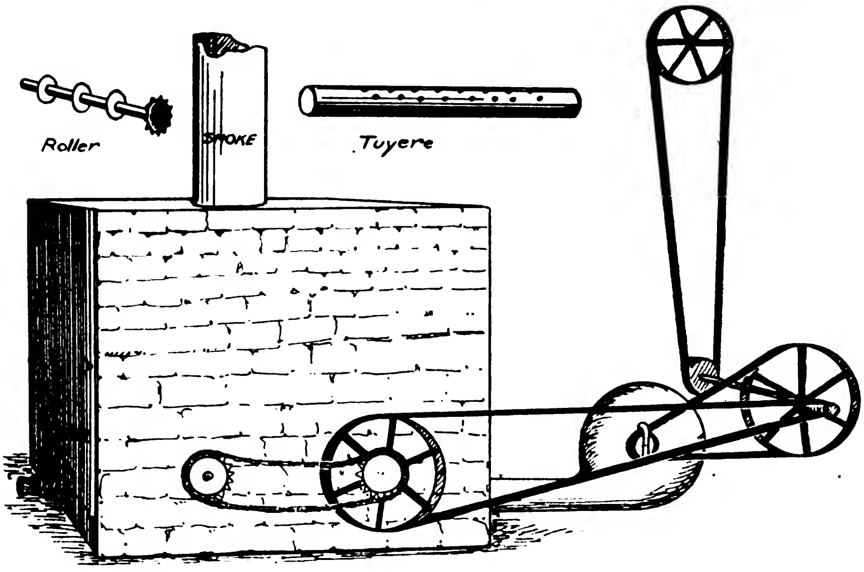
A cement to mend rubber goods: take raw green rubber and dissolve in bisulphide of carbon for a number of days in a tightly-stopped bottle until it has the consistency of thick paste. Have the surface clean and dry, and clamp together.

To keep steel tools in their handles, fill the hole in the handle with rotten stone and powdered rosin, then heat the tang of the tool quite hot, then drive into the handle down hard, it will set firmly when cold.

To remove stains from drawings, etc., take powdered magnesia and put on the stain on top and under it, with blotting paper on each side, then press over the blotting paper with a hot iron. The stain will be gone when the powder is taken off.

To prevent iron that is exposed to moisture from rusting, paint the surface with a liquid of Portland Cement.

Bronzing fluid for steel: take five parts of alcohol, six parts nitric acid, five parts muriate of iron. Mix thoroughly and add ten parts of sulphate of copper and dissolve in fifty parts of water.



AN EASILY BUILT TIRE-HEATING FURNACE

Glue to resist moisture: take one part of glue, one part of rosin, one part of red ocher.

Another moisture-resisting glue is made of one part of India rubber, twelve parts of naphtha. Heat gently, mix and add twenty parts of powdered shellac, pour out on a slab to cool, when ready to use heat it to about two hundred and fifty degrees Fahrenheit.

To harden drills for cutting glass, dip them in a mixture of zinc dissolved in muriatic acid. Use this without tempering.

To improve the color of shellac varnish add a small quantity of gamboge that has been dissolved in alcohol.

To blue brass take and dissolve one ounce of chloride of antimony in twenty ounces of water. Then add three ounces hydrochloric acid. Place the warmed brass article in the solution until it has turned blue, then take out and rinse in clean water, then dry in sawdust.

Cement to stop leaks: take equal parts of litharge, glycerine and Portland cement. This cement will harden under water.

To anneal steel or iron: smear the iron or steel with tallow, heat in charcoal fire, slowly, to a dark red and let it cool slowly.

Drilling compound: take one pound soda common, two quarts of water, one pint of machine oil. This will cause no rust, and is clean to work with.

Iron cement: take twenty parts of sifted cast-iron filings, two parts powdered sal ammoniac, one part sulphur. Mix with water to a thick paste as wanted for use.

A cement for iron joints: mix equal parts of white lead and red lead with enough linseed oil to make a stiff putty.

A cement for leather and iron: to cement leather to iron, first apply acetic acid to the iron with a brush to roughen it. Then take one pound of fish glue and one half pound of common glue, mix it in alcohol and water. Place on the leather and then press the leather on the iron, clean and let dry.

To clean window glass take equal parts of alcohol, water and whiting. Mix the alcohol and water and stir in enough whiting to thicken it, then apply to the windows with waste or cotton cloth, let stand for a short time, then wipe off with waste or cloth.

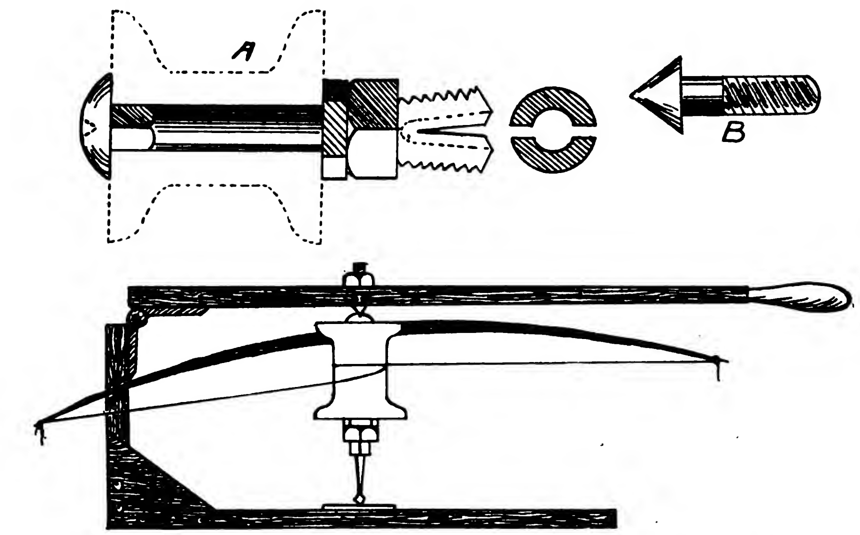
A waterproof paint for stone: eleven pounds of pitch, one pound of lampblack. Mix and add turpentine to give the required consistency.

Cement for water pipes—joints that are under pressure: ten pounds of ground litharge, four pounds plaster paris, one half pound yellow ocher, two pounds red lead. Cut hemp fiber in short lengths and mix all with boiled linseed oil until a putty-like paste is had. Apply to the joint and in about ten hours it will be dry.

A cooling compound for bearings: take two pounds acetate of lead, fourteen pounds hot tallow, two pounds black antimony. Dissolve and stir until cold, then apply.

A strop paste for razors and fine tools: one ounce of levigated oxide of tin, one quarter ounce oxalic acid, twenty grains of powdered arabic. Mix with water to a paste, spread evenly, work well into the strop.

To buff nickle use vienna lime. The



THIS DRILL WILL CUT SMALL HOLES IN VERY DELICATE WORK

prepared is the best. It should be kept in an air-tight can to prevent air slacking. This is also suitable for other metals which require no cutting down.

A Practical Coal-Burning Tire Furnace.

M. ALBRIGHT.

I notice several of the readers want to build a tire furnace. The accompanying engraving shows one I have used for two years with success. The tuyere is of 3½-inch gas pipe. Fifteen ½-inch holes for a distance of eighteen inches being bored for blast. The end of pipe must be closed with a removable plug for cleaning. The rollers are made of ¾-inch gas pipe, cut so as to space the washers or collars far enough apart to allow the widest tires to run between them. These pieces of pipe are fastened by means of a ¾-inch shaft running through them. I use a 16-inch blower and this fire heats tires as fast as one man can put them on. The furnace should not be over 12 or 14 inches wide inside and should have a 10 or 12-inch smoke pipe directly in the center of the top. The rollers should be about ten or twelve inches above the tuyere and two feet apart. Any kind of coal can be used.

A Hand Drill for Fine Work.

BERT HILLYER.

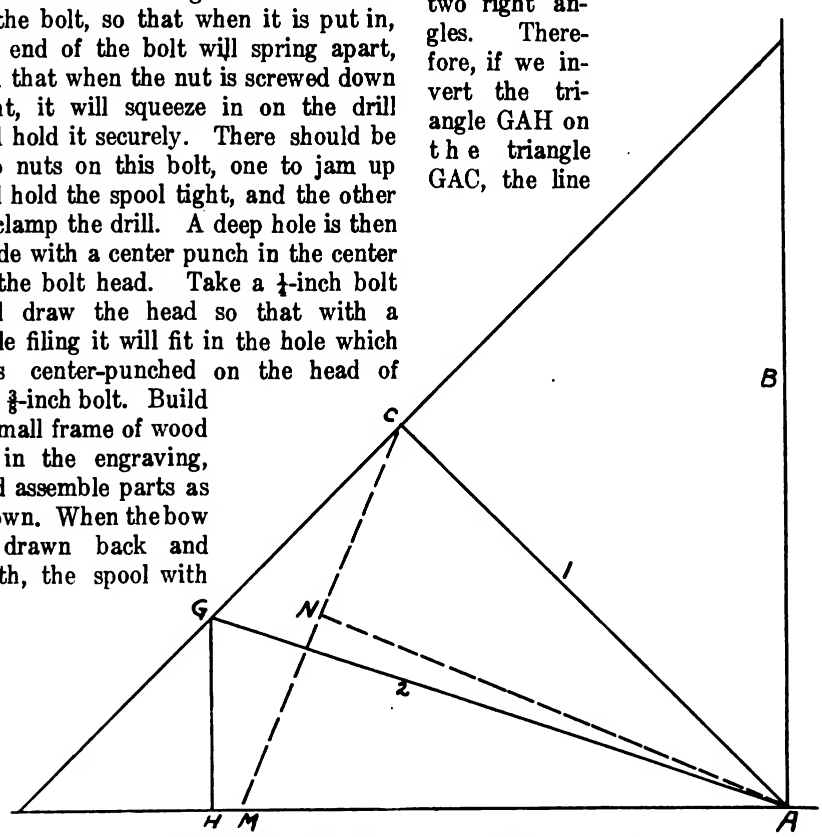
A very handy little tool for drilling small holes is what is commonly called a fiddle drill. This is very easily made, and costs nothing but a small amount of time to put together. All the material required is a spool, a ⅜-bolt, long enough to go through the spool and allow about one inch to extend at the end, one small hinge, one short ¼ or 3/16-inch bolt and one narrow piece of leather or belt lacing, or a piece of stout cord will answer the purpose. Find a piece of springy wood about twenty-five inches long for the bow. The cord is tied on the ends of the bow, leaving it so that when the cord is wound once around the spool there will be sufficient tension to turn the spool. The ⅜-bolt has a hole 3/16 by ⅛ inch deep drilled in the end. The bolt is then taken to the vise and a slot sawed down with hack saw about ¾ inch long. This part of the bolt answers for a chuck to hold the drill. The shank of the drill should be made a little larger than the hole in the bolt, so that when it is put in, the end of the bolt will spring apart, and that when the nut is screwed down tight, it will squeeze in on the drill and hold it securely. There should be two nuts on this bolt, one to jam up and hold the spool tight, and the other to clamp the drill. A deep hole is then made with a center punch in the center of the bolt head. Take a ¼-inch bolt and draw the head so that with a little filing it will fit in the hole which was center-punched on the head of the ⅜-inch bolt. Build a small frame of wood as in the engraving, and assemble parts as shown. When the bow is drawn back and forth, the spool with the drill will revolve rapidly. The drill can be ground so as to cut both ways by grinding it without clearance at the cutting edge and leaving it very thin, or it can be left heavier with a cutting edge on one side, or if it is ground like a common drill it will also cut.

The top piece with handle and hinge are used to feed the drill. The smallest hole can be drilled with this better than by the press which is run by hand. It is very handy for anyone having light, delicate work to perform at home. A hole as large as ⅛ inch can be drilled without trouble if the drill is made right.

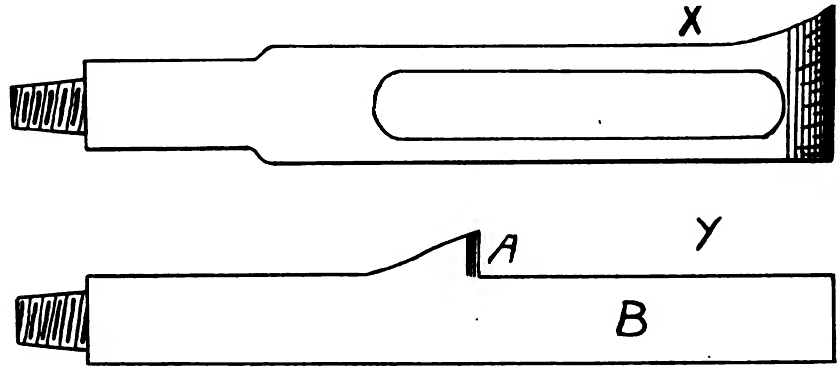
Dividing the Angle.

A. W. BARNARD.

I am too interested to let this angle proposition go by without comment. I think if Brother Metcalf will study his figure a little closer he will find he is wrong. I will assume that the angles between the lines 1 and 2 and the base line are equal. Then by dropping a perpendicular to the base line from the point G we have two equal right triangles with a common hypotenuse; for, by assumption, the angle CAG equals angle GAH and the angle ACG equals the angle GHA, both being right angles. Therefore, the angle CGA equals the angle AGH; for, by geometry, all the angles of any triangle are equal to two right angles. Therefore, if we invert the triangle GAH on the triangle GAC, the line



MORE DISCUSSION ON THE DIVISION OF THE ANGLE



SOME SPECIAL DRILL BITS FOR WELL DRILLING

2 being the hypotenuse and common to both will remain in the same position, and the line AH will fall on the line AC, the two angles CAG and GAH being equal. Also the line GH must fall on GC, the angles CGA and AGH being equal; but we find that the line GH is only about two thirds the length of GC and the line HA is longer than AC, which throws the line AH inside of the angle CAG, making the angle HAG smaller than the angle CAG, which shows that Brother Metcalf is wrong in his theory.

If Brother Metcalf prefers the straight line method he can lay off on the base line a point M from A equal to AC, then by joining CM and drawing a line from the center of CM to A he will divide the angle. Again, by laying off on the base line a point from A equal to AN and by joining N and this last point on the base line and again drawing a line from the center of this line to A the angle is again divided, etc.

Drill Bits for Enlarging Holes.

L. R. SWARTZ.

Mr. H. O. Madison, of South Dakota, asks about a special drill. He does not name the quality of the formation he has to drill, and this makes it a little difficult to advise him as to what kind of tools will answer the purpose in his case. It would simplify matters greatly if parties asking advice would give a full and clear statement of the conditions to be met in these cases as all conditions are not alike and each often requires different treatment.

For soft material take an ordinary club bit and drive in one wing of the bit to line with shank and steel above the flare of the wings, and dress out the other wing so as to make the bit as wide as will go down the casing. See X in the engraving. The tendency of the tools to run plumb will cause the long corner of the bit to shave the hole large enough to allow the casing shoe or collars to follow the bit in soft material. Casing should be kept a little over the stroke of drill off the bottom of hole.

At Y is shown another style. The section B should be longer than the stroke of the drill so that B will always act as a guide to hold the cutting edge A to place so as to cut the hole large enough for casing shoe and collars to follow. This form of tool is really a reamer and requires a pilot hole to be run ahead for guide B to follow. The bit should be as wide at A as will pass through the casing.

For the small 2½-inch or 3-inch tubular well machines, there are on the market various types of "Paddy" bits and under reamers, all depending upon hinged cutters, and depending upon various sorts of hinged joints between the cutters and bit shank. The tools described above are for 5⅝ and 6-inch holes or larger. Almost any good drilling machine company can furnish you the proper tools.

How to Forge A Steering Wheel.

BERT HILLYER.

To make a wheel for a steering gear on a boat, take a piece of steel a little wider and thicker than the hub of the wheel is to be, and split it down the center on both ends as at A. The split parts are then turned out to make the spokes. To do this spread the ends apart and work down to the hub with a small fuller at first, following it up with a larger one until the spokes are equidistant all the way around. Make two rings out of round iron, the inside of rings to measure the same as the outside diameter of the hub. These rings are placed one on top and one underneath the forging, to form the hub. Care should be taken to have these rings directly overtop each other, so that the center of hub on one side will be true with the other. After rings are sunk in to the right depth with steam hammer, a piece of round iron is used to roll the spokes out until very near to size, enough stock being left to smooth up nice and straight. A small place is left about ½ inch wider than the rim and about 4½ inches long. This is split and thrown out, and then drawn down for a handle. The part which is bent should be heavier, so as to allow for the bending and welding. The engraving, at B, shows the stock drawn out, bent around and ready to be welded. At C is shown a tool that fits in the anvil hole; it is used for bending and trueing up after welding, and shows also wheel in slot being trued up. At D is shown finished wheel.

The handles are made of wood with hole through center, and are fastened on with a one-half-round brass cap that acts as a nut on the stem that goes through the handle. This method is for forging a light wheel. To forge a heavy wheel with seven or more spokes requires a different method, which I will explain if the readers desire me to do so.

Frame Making and Repairing.

GEORGE HUTTON.

There has been so much discussion, different opinions and views of frame making and repairing that the subject seems pretty well thrashed out.

I have always had the firm opinion that in the making of new wrought-iron frames we should give more attention than has been given generally, that is, from the beginning of the operations, making the iron from scrap. I do not mean to infer that there has been any intended neglect, but the demand for heavy power has got ahead of construction. There is not enough care taken in selecting and piling scrap. I believe that shingles or slabs for frames should be all double worked; here, again, we are liable to err, as slabs when single

worked under good conditions look all that could be desired.

I believe the back or top of the frames should be forged in one piece, providing the frame is a short one. On consolidation frames it is the custom to forge backs in two pieces, each piece forged from one pile of slabs at least seven high. This for convenience in handling as well as eliminating fagging, on which process there is risk of seams which create breaks later on, even with the best of slabs.

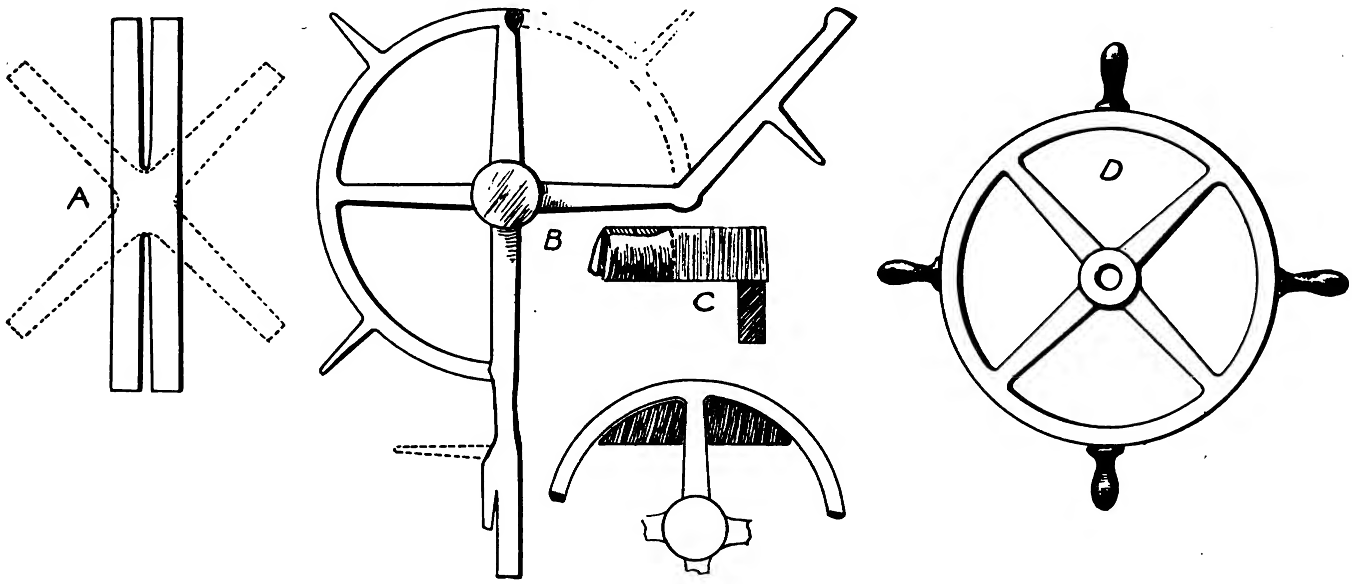
I believe in forging legs from four or five high, piles, of course, double worked, leaving at least four inches on lower end of legs for brace welds. The legs are prepared for welding by cutting or splitting a V and scarfing back of frame to fit V on the leg, and the bottom of V to come in contact with top of scarf, thus insuring a good weld at the crotch. The welding should be at steam hammer in every case, even to turning down and welding scarf. This latter to be done very lightly, without any danger of spreading apart at crotch of weld. I believe in preparing ends of braces and junction of leg by backing up stock to accommodate V-iron and increasing thickness of frame before welding in braces, all braces to be clamped in proper place before welding. The V-iron is prepared from special slabs cut crossways and drawn to suit work, thereby getting the grain of the iron to run parallel with the frame. If frame backs are forged in two pieces, weld two legs on one piece; then weld back with lap weld at steam hammer, taking side heats on both sides to finish weld. Continue to weld on balance of legs and then apply braces; any strain set up while under construction or twist in legs to be taken out by heating and never pened cold.

There is great care and very rigid inspection on all iron frames made in contract shops as to quality of material and workmanship, but we can readily see where the defective parts are when the engine does some mileage and comes to shops for repairs.

In the repairing or the welding of broken parts of frames there is an existing opinion among blacksmiths that cast-steel frames will not stand such a high heat as iron frames when making welds, and that if we heat it as we do iron, we burn it. It is now a well-known fact that we can heat cast-steel frames for making repairs just as high as iron and not destroy the material, because in the manufacture of cast-steel frames it has gone through a much higher heat than we can give it in a forge, as we know it is a poured material and not worked in any way. The failure at welds made on cast-steel frames is the result of underheating instead of overheating as most of us think.

The time has gone when we have to depend on taking all frames to smithshop, since the introduction of Thermit, crude oil and the coming acetylene. The Thermit process I have not any experience with and cannot venture an opinion. Oil welding I have had good success with, both on the M. C. R. R. and at our shops at West Albany (the N. Y. C. & H. R. R. R.). We apply the oil weld wherever we can get expansion and contraction. The most of the welds in my experience have been on braces and between pedestals on the tops of frames. On cast-steel frames our welds have mostly been on top between pedestals. I want to say that I am a firm believer in oil welding on steel or iron frames, when discretion is used.

I do not think it advisable to apply an oil weld when we have to let another part of the frame carry an excess strain, simply to make good the broken part. If discretion were used in determining the advisability of applying an oil weld there would not be so many failures in oil welding. I think we should all give our very best efforts for the improvement of any method of welding frames on engines. We all know what time and expense it saves when a good oil or Thermit weld is made. I am very confident of the improvement in the method of oil welding over our present methods, and we must always remember it is up to us to try and improve on any method that will give us good results in quality and output.



THE STEERING WHEEL FOR A BOAT IS EASILY MADE WHEN YOU KNOW HOW

Why Some Smiths Do the Same Work Quicker than Others.

BERT HILLYER.

Occasionally one man will hear of another man doing a piece of work in a very short time, and promptly expresses his opinion that he cannot do it, clinching the argument with the statement that he himself can turn iron under the steam hammer as fast as the helper can drive it—positive evidence that the second man cannot do what he claims. Now, we will say this doubtful man's name is Brown. He is a good mechanic, and is confident that his own way of working is the best, not having seen anything different. Give Brown a

certain piece of work to do, and this is the way he does it:

The forging is a simple rectangular piece shouldered down from a piece $3\frac{1}{2}$ inches square to $1\frac{1}{2}$ by 2 by 4 inches long. Brown, in starting the work, center punches the place he wishes to shoulder down, heats up and takes over to steam hammer and then looks for center punch mark. Being unable to find it he turns the piece over and over, with the helper, trying to scratch off the scales which hide it. At last it is found, but the iron has cooled off quite a little during this interval. After shouldering down, he starts to draw out to size. While drawing he places stock clean across the hammer die and draws it out. When he thinks it is somewhere near size he stops hammer and tries calipers. He has to go very slow now and most likely has to take another heat, after which he carefully hammers and tries calipers until finished.

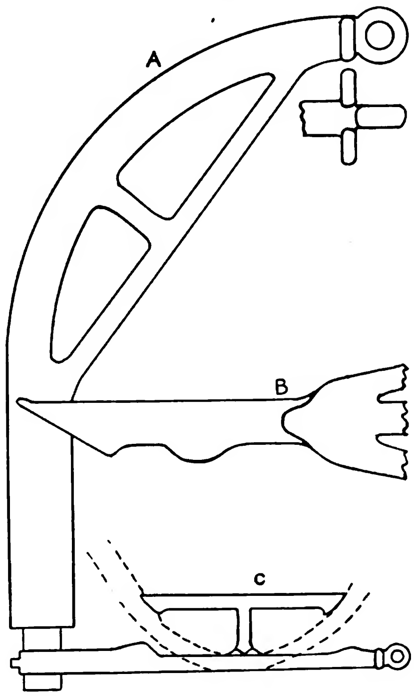
Now we will give the job to the second man whom we will call Smith. Smith marks the place he wishes to shoulder down, takes a tram and marks and center punches the length of the tram from the shoulder. He makes a small ring around this center punch mark with a piece of chalk, so there will be no time lost in finding the punch mark on the black iron. When bringing his piece to the hammer he puts one point of the tram in center punch hole in the back and the other end of tram marks the place to shoulder down. After shouldering he starts to draw down, and instead of placing stock all the way across anvil die, he starts his at about one quarter on the die, and jogs it as he goes along. This draws it very rapidly. When it approaches desired size he has a helper holding between the dies, on bottom die, a piece of steel $1\frac{1}{2}$ by 2, the size of the finished piece. This acts as a gauge. When the hammer strikes the 2-inch side all the length of the forging they both turn their pieces and draw down until the hammer touches tool on $1\frac{1}{2}$ side again and the forging is the correct size. This is all done without stopping the hammer, except to put the gauge under, and the job is completed in about half the time and in one heat. Now, if Smith lived up in the State of Maine and told how quickly he could do things without explaining how he did them, we could not blame Brown of Missouri for saying "You will have to show me." In my next article I will show how Brown showed Smith a kink.

In most all forging and smithing jobs there are several different ways of working. All may perhaps be correct, but some ways are quicker than others. And other things being equal, the quicker way is the one to be preferred.

How to Forge Davit Irons.

BERT HILLYER.

On all vessels there are a pair or more of Davit irons. These are used to raise and lower the small boats in the water. Some are very easy of construction, being only a round bar with an eye on one end and bent in a part of a circle to clear the boat. The other kind are made with a cross piece to strengthen the bow part and two small eyes on each side of the large eye. I think the short brace in the center is unnecessary, but as the



ANOTHER JOB FOR THE SHIP SMITH

blue-print called for it that is the way it was made. In starting to make this forging it is best to lay out the bow part full size with a line through the center, so as to get the right measurements.

To find the weight in this forging or any piece of round iron take as many $\frac{1}{4}$ inches as there are in the diameter of the round piece and multiply it by the same number. Divide this by 6, which gives the weight of one foot. If the largest part of this forging is 3 inches there would be 12 quarters; therefore, 12 x 12=144 divided by 6=24 lbs. If the piece were 5 feet long it would be 24 by 5, which is equal to 120 lbs. In brace and cross piece there are 7 feet of $1\frac{3}{4}$-inch stock. As there are 7 quarters in $1\frac{3}{4}$ we find the weight of the brace and cross piece as follows: 7 x 7=49 ÷ 6= $8\frac{1}{6}$ x 7=$57\frac{1}{6}$ lbs. In the bow there is 9 feet by $2\frac{1}{4}$ inches round. Its weight is: 9 x 9=81 ÷ 6=$13\frac{1}{2}$ x 9=$121\frac{1}{2}$ lbs. In the short piece at the bottom the measurements are $2\frac{1}{4}$ inches round by 3 inches long; therefore, in one foot of it there will be 9 x 9=81 ÷ 6=$13\frac{1}{2}$, and as 3 inches equal $\frac{1}{4}$ of a foot we take $\frac{1}{4}$ of $13\frac{1}{2}$, which equals $3\frac{3}{8}$ lbs.

The large eye on the end is $2\frac{3}{8}$ inches inside and $1\frac{1}{2}$ inches round. To find the amount of stock in this we add $2\frac{3}{8}$ and $1\frac{1}{2}$ and get $3\frac{7}{8}$; this multiplied by $3\frac{1}{7}$= $12\frac{5}{28}$. So, in order to make them, it will take a little over $12\frac{1}{8}$ inches of $1\frac{1}{2}$-inch round iron. In $1\frac{1}{2}$ inches round there are 6 quarters; therefore, 6 x 6=36 ÷ 6=6, so one foot weighs 6 lbs. Now, the two small eyes are $1\frac{3}{16}$ inches inside with $\frac{3}{4}$-inch stock round, therefore it takes $\frac{3}{4}$ + $1\frac{3}{16}$=$1\frac{15}{16}$ x $3\frac{1}{7}$=$6\frac{10}{112}$, so in the two eyes it takes a little more than a foot of $\frac{3}{4}$-inch round iron. In this piece we have 3 x 3=9 ÷ 6, or $1\frac{1}{2}$ lbs.

So the whole forging must weigh:

3	inches	round	5 feet long	=	120	lbs.
$1\frac{3}{4}$	"	"	7 " "	=	$57\frac{1}{8}$	"
$2\frac{1}{4}$	"	"	9 " "	=	$121\frac{1}{2}$	"
$2\frac{1}{4}$	"	"	3 inches long	=	$3\frac{3}{8}$	"
$1\frac{1}{2}$	"	"	12 " "	=	6	"
$\frac{3}{4}$	"	"	12 " "	=	$1\frac{1}{2}$	"
					$309\frac{1}{2}$	lbs.

Another way is to get the cubic inches in the whole piece and multiply that by .2835. This is for either square or round stock of mild steel. In a piece of $2\frac{1}{4}$ inches round, 12 inches long, there would be $2\frac{1}{4}$ x $2\frac{1}{4}$=$5\frac{1}{16}$ x .7854=3.9760 x 12= 47.7120 x .2835=13.52, making a little over $13\frac{1}{2}$ lbs. for 1 foot. A piece of square $2\frac{1}{2}$ x $2\frac{1}{2}$ x 12 inches long would weigh $2\frac{1}{2}$ x $2\frac{1}{2}$=5—$\frac{1}{16}$ x 12=$60\frac{3}{4}$ x .2835=17.22 lbs.

The lower part of the Davit is made of 3-inch round stock. We upset the 3-inch round, as shown, just back of the place where we start to draw it down to $2\frac{1}{4}$ inches. This part is drawn so that a lump is left in the middle of the bow where the cross brace is welded on. The end with the eyes is then made—a piece of $2\frac{1}{4}$ by 4 inches is drawn down and blocked out as in the engraving. After being split the sides are worked out into two small eyes, the piece in the center making the big eye. This is next welded to the long bar made in the beginning. The cross piece is made of $1\frac{3}{4}$ inches round. This is upset in the middle and the short piece welded on. The end is upset well so as to form a heavy scarf and is jumped on the main piece, as shown. It is then bent, as dotted lines show. The scarfs are made V-shape and a fuller put on each side to draw out the lip. This is split lengthwise and swelled out so as to receive

ends of cross piece, making a male and female weld. The heat for welding must be taken very slowly and carefully. This is a very awkward piece to handle, especially in making the last two welds, so there should be plenty of help

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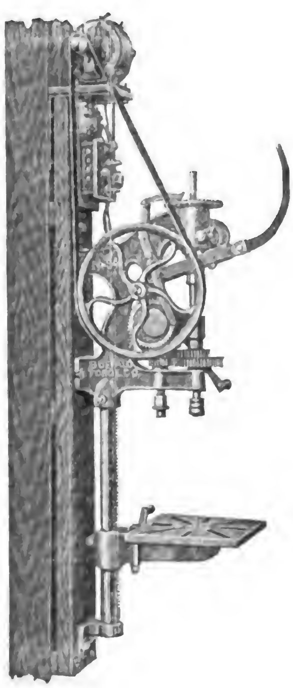
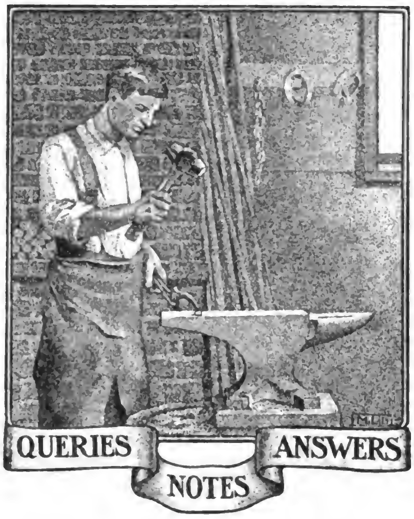
An Electric Power Drill.

Herewith is illustrated a drill operated by a small electric motor, just put on the market by the Buffalo Forge Company, Buffalo, N. Y. It is fitted with a one-half horsepower motor, either for direct or alternating current. As will be seen from cut the motor is placed on a bracket above the drill, and belted on to a modified flywheel in a way to give the required speed for the heaviest work. The speed of the drill can be changed independently of motor speed, by pushing the collar behind drill chuck up or down, giving two speeds. The feed can be operated both by hand and automatically. The automatic feed is adjusted to three speeds. The lever or hand feed is provided with "Quick Return," which automatically returns the drill spindle after each operation to highest point, ready for the next piece of work. Besides being very convenient on all kinds of work, this drill saves much time when a lot of reaming, boring or drilling of small holes has to be done, as it enables the operator to use the lever feed with *one* hand, while holding the work with the *other*.

The power cost is insignificant when the drill is run intermittently, as is the case in most blacksmith and wagon shops, and even when run continuously the cost is very moderate.



A BLACKSMITH'S DRILL RUN BY ELECTRICITY



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

Wants to Make Small Castings.—Will some of "Our Folks" please inform me through "Our Journal" how I can make small, plain castings and what is necessary besides a good fire? C. DANA BUSCH, Ohio.

To Find Leaks.—Do you know of any contrivance made that is used to find leaks in underground pipes? If you know of any, I should like the address of the manufacturers of same. E. L. PARDEE, Iowa.

A Band Saw Query.—Would like to hear through the paper from some of the boys who have a 20-inch band saw. I want to know if this size is strong enough to get out sled runners three inches thick.
C. W. FLUENT, Maine.

Wants a Tire-Heating Furnace.—I would be very much obliged to you if you could give me an idea through your valuable paper of a furnace to heat wagon tires for setting them the old way. I am in a country town in which we have neither gas nor power.
LOUIS PRANG, Ontario.

A Power Tire Setter.—In the December, 1910, issue, on page 75, I see a letter from A. E. Hardy, of Kansas, who says he has a Brooks Cold Setter which he has geared to his engine. I would like to know how he did this, as I also have a Brooks, and would like to see a diagram of his gear.
E. W. DAVIS, Kansas.

Glass Cutters of Steel.—Could you tell me how to harden a piece of steel to cut window glass. Now, I tried cooling it in lead and in mercury, but, while it would scratch for a while, it would not break even. It is thick glass used for sky lights, and was ordered one length, and there are different sized lights. If you can tell me how to cut it I will be very thankful.
C. E. CALLAHAN, New Jersey.

Some Home Practices.—I was reading about some South African methods of paying the smith. I am sorry to say you won't have to go out of United States to find such people. We have them right here in Ohio. Farmers come to us and ask for the use of our fires while we go to dinner, so they can fit some old shoes for their horses. They are getting to do most all their own blacksmithing and that of their neighbors.
CHARLES CHISM, Ohio.

Wants a Gas Tire Heater.—I should like some information on building a furnace to heat tires with natural gas. Will some of our brothers be kind enough to tell me how I can build this myself. I have a cold tire machine which does good work, and I like it in every way, but I have some customers who want their tires set hot, and it is always my aim to give people just what they ask for when they come to my shop. Therefore, any information on this subject will be greatly appreciated.
JOHN WITTMER, Oklahoma.

A Foundered Horse.—I want to describe a horse I have been shoeing. He has been foundered. I can't say what the owner has done to him, but I have shod him in every imaginable way I know of and got his feet in good shape, but last spring he was foundered again. I am still shoeing this horse. The inside of the foot extends $\frac{3}{4}$ of an inch below the horn of the foot. I am shoeing him with high calks and a flat toe and with leathers under the shoe. If any smith can give me any idea through "Our Journal" I would be very much obliged.
W. H. BISHOFF, Missouri.

That Special Drill Again.—In regard to Brother H. O. Madison's query on well drills, I wish to say that in regard to well drill cutting larger than the casing, I handle in my shop many well drills cutting $6\frac{1}{2}$ inches to 4 inches. I make the bits to drill inside 6 or 5-inch casing by making one side of the bit straight and the other to extend $\frac{1}{2}$ to 1 inch wider, and then the bit cuts more on one side than on the other, and cuts a hole larger than the casing. Make the bit so it will go down in the casing. You will find this will work O. K. All of my customers are satisfied with them. The drill will work in the center of the hole and the long side of the bit will cut under.
W. A. GROVES, Colorado.

Good for Lame Horses.—I have never written to THE AMERICAN BLACKSMITH before, but seeing a question in the February issue from Brother Chas. F. Koskey, of Pennsylvania, in regard to lame horses, I just could not refrain from telling him of my experience along the line of lame horses. Our liveryman had a horse that was exactly as Brother Koskey's, and I tried all kinds of shoes on him to no avail. Finally, I tried the Humane Cushion Heel Shoe, and after he had worn them for a while he quit limping and is now as good a horse as he has in the barn. I would suggest that Brother Koskey try the same remedy on his horse. J. J. ALLEN, Kansas.

Questions for Vehicle Makers.—What is the best way to determine if a buggy or wagon is running on a plumb spoke when it is all set up with the wheels on? For instance, a gentleman brings in a buggy or wagon to be repaired, and you desire to find out if the wheels are standing square under the rig, how should one measure to find out?

Would some brother smith kindly give me proper methods of forging fifth wheels (or circles) for heavy spring wagons and buggies, both upper and lower half of circle. Also, how to forge draw clips (or shaft couplings) for heavy and light rigs.
C. CRAIG, Quebec.

A Veteran on Tire Setting.—I am an old blacksmith and wagonmaker, having been

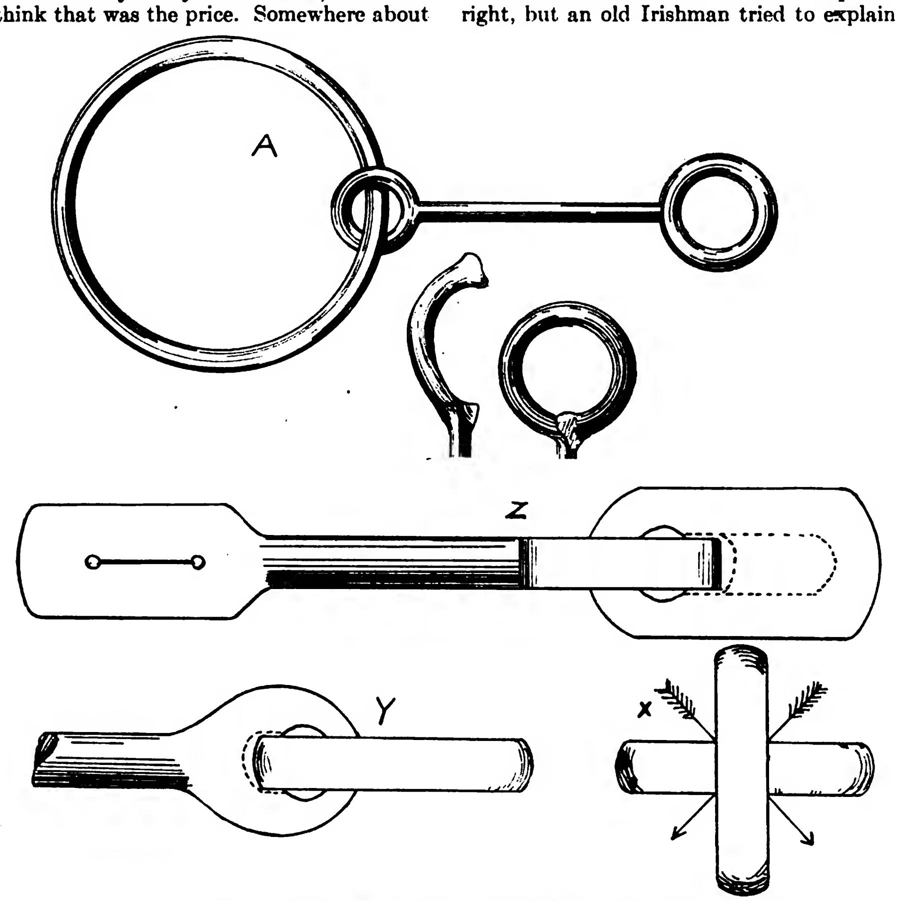
in the business more than sixty years, and I like your paper very much and think it contains many things of interest and information to the trade. I have often thought that I would like to help it along by giving you and the rest of the boys some of my experience in the work. For instance, on the subject of tire setting much might be said. I think the only proper way to set a tire is first to remove the tire and carefully examine the spokes and see that they are not loose, either in the hub or the felloe. If they should be loose, wedge them up with wooden wedges, being careful that none of the spokes are left extending past the felloe, as they will cause the tire to rest on the spoke. The wheel should then be firmly screwed in a press made for that purpose, and left there until the tire is put on and the proper dish set.

CHAS. CURTIS, Nebraska.

Smithing Prices Before the War.—In answer to C. B. Staples, of Maine, in your January number, I can give him figures copied from a book kept by my father from 1849 up to war time. The price of four new shoes was $1.25, and resetting four shoes was 50 cents. There are other charges in the book: $1.33 for four shoes. Horses were shod by the year for $8.00; at least I think that was the price. Somewhere about 1858-9 the horseshoers got together and put the price up to $1.50 a set; bar shoes, $1.50 a pair; and it remained at these figures until war times, when shoers got $2.50 a set. At their first meeting they cut out contract work. I have been at the business since 1862, and I have never shod a horse by contract. In regard to wages, they received from $1 to $1.50 a day. This I know to be a fact. There were no nine-hour days or half holidays on Saturday. In my city there are horses shod at the old prices, and the horseshoers think they are business men. You may judge for yourself about that. JOHN B. HARDING, Massachusetts.

Shoeing and Horses.—We have had a good shoeing winter here, and during January have been busy all the time, as the ground was covered with ice and a barefoot horse couldn't navigate very well, some of them coming to the shop with sacks on their feet so as to get here. I would like to hire a man like Brother Mann, if you know where I can get one. I had one at one time who drove and finished a set of shoes in eight minutes, and I thought that was going some. I should also like some of those men that can shoe any horse without ropes or stocks. I have worked in a good many different shops in different parts of the country before settling here, and I never met one of those fellows who wouldn't duck when a buckskin broncho with stripes on his legs or a baldfaced one with four white feet who could fan his ears with his hind feet came in, and would wait till somebody else tackled him first to see whether he got killed or not.

Say, did you ever hear of a "Cavison?" I don't know whether I have it spelled right, but an old Irishman tried to explain it to me. He said every stallion man and blacksmith in Ireland had one, and it is a hinged contrivance that fastens on the horse's nose and buckles under his jaw, about where the halter sets, and has a rope on a ring in the front that you yank to make a horse mind. I am going to try and make one from his explanations and try it, as we have some awful mean horses to work with here. J. S. CORNWALL, JR., Iowa.



HERE ARE TWO METHODS OF MAKING THIS FORGING

A Special Forging.—Questioner from Ohio asks about making a forging as in A. I should do it this way: Take 10 inches of ½-inch round iron, which allows ¼ inch for each weld on the eyes. Upset and scarf as in engraving, this method allowing it to be welded in a very short space and resembling a solid eye when finished. The ring will require 11¼ inches of stock, allowing for upsetting and welding.

To make a forging like this out of a solid would seem an impossibility to some smiths. It might seem impossible, but it can be done. If this forging were made from copper or some metal which was hard to weld in a smith's fire this method would make the stronger job. The engraving explains itself. Take a piece of 1¼-inch square stock and draw the round part down first, leaving 2½ inches of 1¼ inch square on the end. Flatten ½ of it on the end, after which take small, narrow fullers, top and bottom, work out in a cross shape and finish up with a set hammer in the corners by placing one wing at a time in the slot hole in swedge block. An end view of it will then look like X in the engraving. Two holes should be drilled through as arrows mark. Two side views are shown, with dotted lines to show where they are cut around to meet the holes. The ring is then swelled out and worked round, and as the diameter of the stock is worked smaller it gives a chance to true up the eye. The other end is split, as shown, and swelled into an eye. If anyone is doubtful about this ring and eye being made in one piece, let them take a piece of soft pine wood and cut out as in sketch, and they will soon be convinced.

BERT HILLYER, New Jersey.

Some Notes on Several Matters.—An item in the February issue that rather amused me was the one in which Mr. W. R. Hunter tells about being stung to the tune of $20.00 on the old silver-plating liquid gag. Having sold those goods myself I know what it is composed of. If the gentleman will get a nickel's worth of nitric acid and a nickel's worth of quicksilver and place them in a bottle, letting them dissolve and mix, and will then add about a half pint of water and five cents worth of carmine to color it he will have the same dope that fellow sold. This solution will work only on brass and copper and will last about twenty-four hours. Lots of one cent pieces have been passed for dimes by using this solution. It will have absolutely no effect on iron or steel. It is made to sell.

If Mr. Chas. F. Koskey would tell us what causes the lameness in his horse's foot, some of the craft might be able to tell him what to use as a cure, though horseshoers don't always cure lame horses.

In reply to Brother J. B. W. Morris, would say that there are two classes in the world—the producing class and the non-producing class, or, in other words, the capitalist class and the wage earner. From all appearances the capitalist class is the more intelligent or educated. The reason of this is because they have sense enough to live from the labor that some one else creates. The laboring class has been of the most benefit to the world.

If Bernard Schirkling will use a little kerosene oil on his blower he will find it will work easier, and if he welds his calks on properly they will not become loose in sharpening. R. VOLLMER, Illinois.

Twenty Dollars a Day.—While it is quite true that experience is the best teacher, it is also true that a person must be put next to at least a few things to experiment on. Reading "Our Journal" is one way of getting "next." I think it is the best medium of its kind published. I feel as if it is something that I actually need in my business. While I have not been working at the blacksmith trade all my life, I have been around the shop some. My father never worked at any other trade that I know of. I have been working for the past year with a man who has a fairly well-equipped shop. We do very nearly all kinds of repairing.

I noticed in your October, November and December numbers quite a great deal concerning cold-tire setting. I wish to say a few words on this subject, not that I am able to make a great speech or anything like that, but from the standpoint that the tire setter is part of our equipment—it is the House Power Machine. It will do more work and better work than can be done the old style of hot setting. We guarantee all work done on this machine. The judge is the man for whom we do the work. It is no uncommon thing to make $20.00 per day on this machine alone. I believe most edge grip machines are all right, but I know nothing about any of them except the House and Brooks.

I think Brother Crabtree, of Missouri, puts up a good talk on this subject. If a man living today in this world, with its great improvements and advantages, is stumped on the principles of cold shrinkage and professes to be a mechanic he has entirely missed his calling.

L. T. Pedigo, Kansas.

A Talk on Wheel Work.—I have been a reader of The American Blacksmith about three years, and am well pleased with "Our Journal." I welcome its arrival and read its advertisements and everything else. I like to read the various articles on auto work, shoeing, forging, woodwork, etc., though, of course, I don't always agree with the writers. I notice there is much disagreement about dish in wheels, gather, etc. Some get momentum, centrifugal force and many other things confused in a subject with which they have little or nothing to do. Now, I will add my opinion to the list. We give a wheel dish in the first place to simplify its construction, as it is much easier to fit a rim to a wheel if you can allow a little dish to draw into the wheel than if you had to make spokes and rim fit up solidly and keep the wheel straight. Secondly, we give a wheel dish to brace it against end thrust, because the greatest strain comes on the outside wheel when rounding a curve at high speed, so it is plain a wooden wheel must have dish. Then, also, if a wheel has dish you have to lean it out at the top to get a plumb spoke, and a plumb spoke is the only correct method. We all know that a wheel always guides to the side toward which it leans. This we overcome by giving the axle gather, just enough to make the wheel steer clearly and easily between the collar and the nut. We also know that the "under-ax" must be in proportion to the dish of the wheel and, according to my experience, one third of the "under-ax" is about right for the gather. This is my opinion on the wheel subject. It seems clear to me, but, of course, is not expected to be as clear and reasonable to everybody.

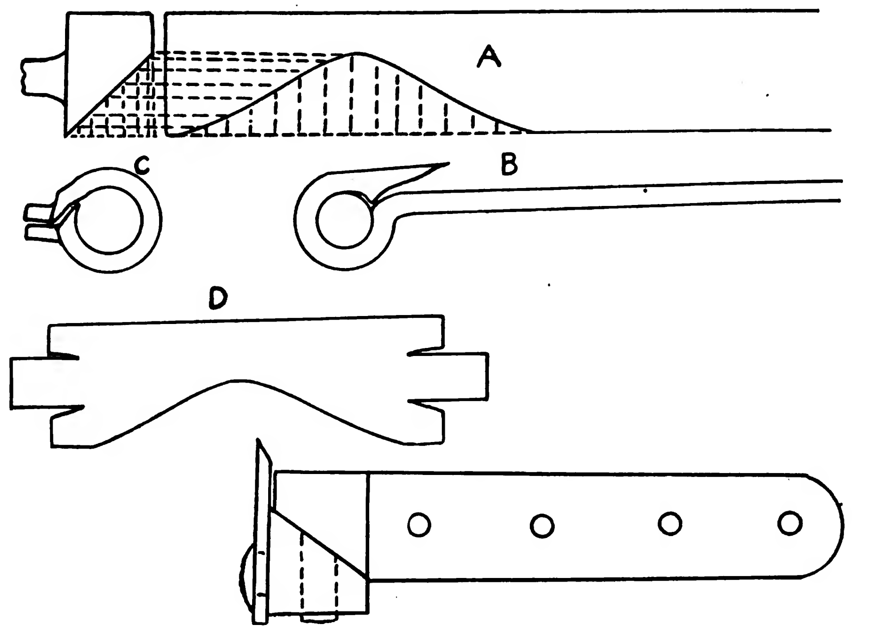
Otto A. Wagner, Kansas.

A Canadian General Shop.—My shop is 20 feet wide by 40 feet long, with a lumber and woodshed at back. I have a 4½-H. P. gasoline engine, an emery stand, a Silver hand and power drill, a 12-inch rip saw, a 26-inch band saw, a 9-inch buzz-planer, a turning lathe and a cider mill. I do both wood and iron work and horseshoeing. I have a Royal Western Chief blower, a 142-lb. Hay-Budden anvil, a Lancaster edge-grip tire upsetter, a shear and punch, a shoeing vise, two bench vises, a set of Butterfield ¼ to ¾ dies, three pair bolt cutters 5/16 to ⅝, a complete set of wood-working tools and a good supply of small tools, such as Westcott wrenches, Coe's monkey wrenches and ratchet tire bolt wrenches, sledges, hammers and good shoeing tools. I like the trade and like to have plenty of good tools to work with, and it pays to keep them in good shape; but, best of all, I like The American Blacksmith. I will never be without it as long as I can raise the price. Work is plentiful here, but prices are low, although since I put in power I can do work so much quicker that I make a fair profit

I think Donald Laing, in the December issue, is certainly a fast man at horseshoeing. I am glad he is in Scotland, for I think if he were anywhere near here there would be few horses left for we "slow men" to shoe. I have worked in different parts of the United States and Canada, and have met some fast shoers, but I could always keep pretty well up to them if they did a good, honest job. If there are any more men like Donald Laing I would like to hire one, so I could retire in a short time. Of course, wages would be a small item, considering the income.

Garnet E. Rowe, Prov. Quebec.

The Gravity Hinge and Square Chain.—"Questioner" wants to know how to make a certain forging, marked B on page 72 in the December journal, out of 1¾ by 5/16 stock. This could be made by upsetting and welding the lugs on the edge of the piece, beginning with the center one first. A more convenient way, however, would be to take a piece of 5/16 by 2 by 2-inch angle iron and cut out the spaces on one web, or side, or it could be cut from 5/16 sheet steel and the lugs bent up.



HOW TO FORGE THAT GRAVITY HINGE

To make the gravity hinge at C, mark off the amount of metal it takes to make the eye, allowing enough for a scarf for welding. Space off an equal number of marks on the strap part from center of eye as there is in the short piece and draw a line where the parallel lines meet. This is to obtain the right shape when bent around a circle for both pieces. The short part of the hinge can be cut out as at D in the engraving, so that it can be welded, as at C, the rivet part being welded on the flat part of the anvil and the two ends welded on the point of the horn with two heats. The ends are then trued up on a pin, which is 1/16 inch larger than the pin on the strap part. This, when completed, will look like a solid eye and is ready to be riveted to the plate. At B is shown the strap part bent around the pin, ready to be welded together.

Square chains, if they are the kind that I mean, are bent cornerwise and are welded in a spring tool which has the impression of the end of the link sunk into it. The link is scarfed, bent around and slipped into the tool at a welding heat. A few blows are struck to weld it, after which it is taken out and the fin cut off which was squeezed out between the dies.

Bert Hillyer, New Jersey.

A Talk on Tire Setters.—In your February number you ask for opinions on cold-tire setting. I have been using a Scientific Tire Setter for some time and would not be without it, although one cannot set all tires with it. All good wheels can be set; but take an old wheel with poor felloes that has been run until the tire has run off—if

the tire is thin you can set it right, but if the tire is heavy you cannot set it, for the tire cannot be put back on the wheel so it will fit; and when you hammer down the high places you will surely break the felloes. Or take a wide tire which is worn thin with these edge grip machines, when you put on pressure it will bulge the tire. Of course, the manufacturers make bands for setting thin tires. There is one thing about these machines—the manufacturers could make them more complete for what they charge for them.

I use a straight edge in deciding how much draught a wheel has. The last tires I set hot I used a straight edge on all wheels and kept an account of how much it dished each wheel, good and poor, so now I get the same dish as I did when I was setting tires hot. There is another thing about cold setting: You must shrink the tire in a good many places. If tires are not very loose I shrink them in three places, though I have shrunk them in as many as six. If you take your time it is better than hot setting. I have set four wagon tires in 30 minutes, with the wheels in good shape. Of course, I am not one of the fast men.

I have a power shop and run everything in the shop by power. I have an 8-inch bed lathe, trip hammer, disc sharpener, drill press, emery stand, band saw, planer and cut-off saw, also other small machines. I also have a 1½-H. P. dynamo with which I light my shop. I also do all kinds of auto repairing and find that it pays.

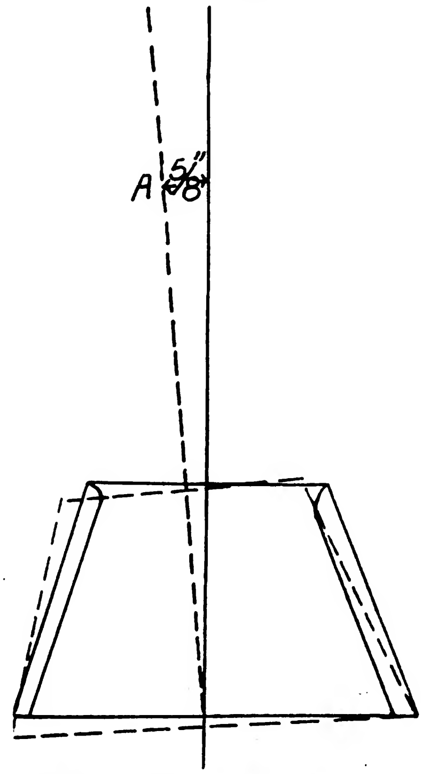
O. R. Hamer, Iowa.

Setting Skeins and Boxes.—Being an interested reader of The American Blacksmith I find many different points discussed in regard to smithing which have paid me many times over the price of a year's subscription, and I feel that what little I may know in regard to a few things concerning the blacksmith shop may help a brother smith. I, therefore, take the liberty of answering Mr. A. W. Senter's questions which appeared in the December number. Like myself, Mr. Senter would appreciate further advice along the line of hardening plows.

The best results I ever had in setting skeins and boxes, old or new, on heavy two-horse wagons were obtained thus: After removing old skein, clean the axletree with an old file or horse rasp, or anything that may be used as a scraper. After marking axle for distance to set skein from center to shoulder, get some very fresh cow manure, the softer the better, and spread it good and thick with a wooden paddle all over the point of the axle and as far back as is needed to pass the shoulder. Have the skein hot enough to spit when water touches it, place it over end of axletree and cool off at once with water, and that skein will remain solid till it is taken off. I have set a great many that way and never knew of one giving the least trouble in resetting boxes, old or new. I use red or white lead mixed with linseed oil to the consistency of wagon grease. Spread it thickly all over the inside of hub, place box and drive home, using an old broken box as a drift with a piece of ¾ by 3 inches flat iron on top to hammer on After box is in place I take a chisel which I made from an old file and use it to cut four wedges in both ends of the hub. By putting the wedges in the wood about ⅛ of an inch away from the box it works fine, and there is no danger of cracking the box or getting it out of line.

F. L. Davis, Arizona.

Shoeing the Interfering Animal.—Mr. W. M. Schneider, of Iowa, says in his answer to Mr. Boyes' question: "I would advise him to pare down the foot about ¼ inch lower on the outside." What in the name of goodness does he think a horse's foot is made of? That is a new wrinkle for me. Talk about hayseeds shoeing horses! What



WHEN THE FOOT BEARING IS NOT LEVEL

shape would the pastern joints be in if we were to tip the foot ¼ of an inch? I will show a diagram to illustrate the position of that animal's foot.

Now, kindly observe the engravings. We will say the foot is 5 inches wide, which is the average width, and 7 inches to the upper pastern joint. If we tip either side of the foot ¼ inch, at A, the limb would be ⅝ inch out of line if there were no other joints to bend. But there are two—the lower pastern joint and the coffin joint, so each has to take an equal part of that false alignment. Now, how long do you think a horse would stand up under such treatment as that? Then our brother also says: "If you use toe calks, the calk should be ¾ of its length inside of the center." Think of the cruel punishment to the dumb brute.

What makes a horse interfere? The simple reason is that they travel too close and when you pare the outside of the foot down you are going to make them travel still closer and cause them to break over on the outer toe. If you are going to stop the defect you have to make them travel wider and cause them to break over at the inner toe. My advice is to pare perfectly level and use a side-weight shoe. In very bad cases making a special shoe which you will find in the article by Brother Monroe Hibbard, of New York, on page 129 of the February issue. Read it and study it. It is good common sense and written by a brother who understands his business. On page 130 we have two shoes recommended by our Brother C. H. Eastman which are also good shoes. By all means, brother, keep the feet level and you will have less trouble with interfering.

C. W. Metcalf, Iowa.

Photographic Arguments.—For several years past your Journal has been a welcome visitor to my office, and once or twice, perhaps more often, I have had the honor of contributing a few remarks on carriage repairing. Whether said remarks were good or otherwise I am not prepared to say; but press of business and other matters compelled me to lay aside my literary efforts and ambitions and alone prevented me from further afflicting you and your readers during the last three or four years. During that time I have seen an abundance of good things in your papers and, between ourselves, some trash. True, this latter stuff could not be helped, as, for instance, the thing I now am trying to put over on you.

That argument between Metcalf and the farther Westerner was splendid, especially where Metcalf tries to lay out his opponent by showing him "the sort of man he is debating with," giving him his quietus, as it were, by putting his picture to the fore. If the other fellow did not at once go to the woods and crouch down he is possessed of more pluck than real good judgment, in that Metcalf's picture, with two fingers of his right hand touching the right side of his head (I don't understand what that pose means), and wearing a full beard, which, for all we know may be full of cinders and other missing things, certainly ought to produce the effect intended by the great Iowan. And he surely is great! When work comes from seventy thousand—or was it only seven thousand—miles away, a man has just and good reasons for supposing his picture alone will settle any argument.

Fair Warning and Notice!

On and after this date it will be useless to try to argue anything with me through the columns of The American Blacksmith unless the party of the second part agrees not to draw his picture on me.

Witness my hand, this umsteenth day of 1911.

Richard O'Hearn,
Party of the first part.

I have a little criticism on Mr. Mumma's method of welding a spring. He says to scarf it, punch a hole in it, lay in between the scarfs a thin piece of iron, and rivet the whole together before taking a welding heat. This is all wrong. Why? Well, briefly, he will have to take a welding heat on two thicknesses of spring, while there is only one thickness to withstand that heat at the end of the scarfs. That one thickness will waste with overheating, while the two thicknesses are getting the welding heat. Anyone ought to know that without being told of it. The right way would be to knock in the corners, scarf and heat separately, and weld and finish in one welding heat. If necessary, one could take another light borax heat. I could prove all this if I had my picture convenient.

Richard O'Hearn, Kentucky.

VOLUME 10 THE NUMBER 8

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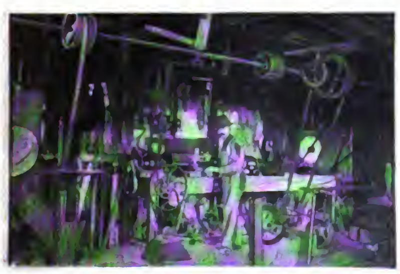

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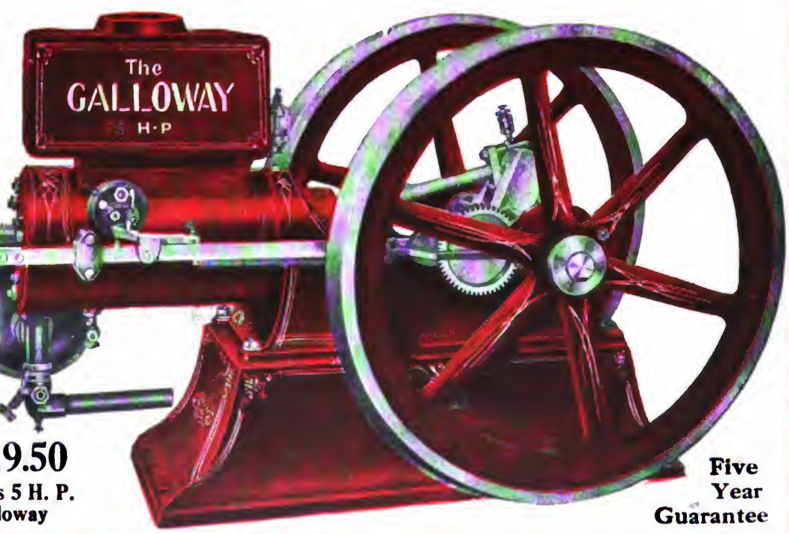

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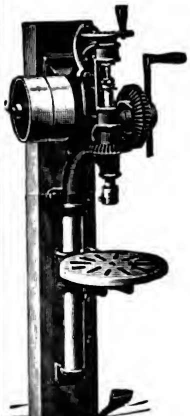

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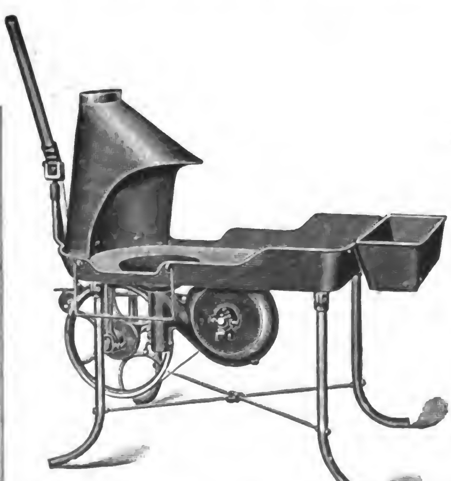

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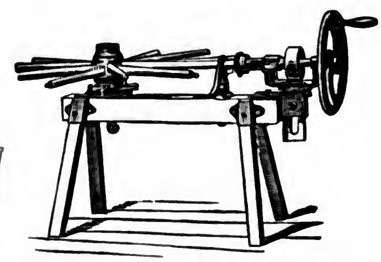

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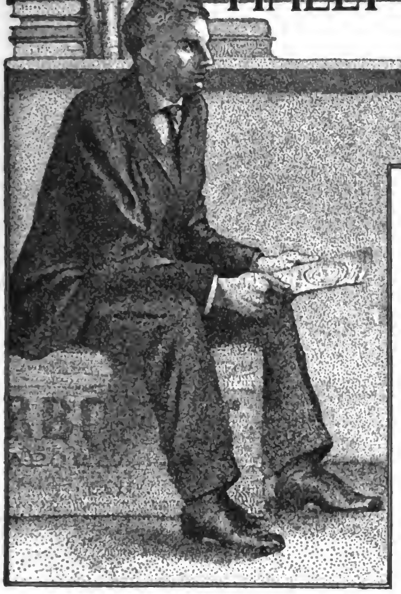

The American Blacksmith is published monthly at The New Sidway Building, Buffalo, N. Y., U. S. A., by The American Blacksmith Company. Incorporated under New York State Laws. Entered, February 12, 1902, as second-class mail matter at Buffalo, N. Y. Act of Congress, March 3, 1879.

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Albert W. Bayard, - - Secretary.
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Subscription Price: $1.00 per year in advance, prepaid to any postoffice in United States or Mexico. To Canada and other countries, $1.50, or, 6 shillings. Reduced rates to clubs of five or more on application. Domestic long-time rates, strictly in advance: Two years, $1.60; three years, $2.00; four years, $2.50; five years, $3.00. Single copies, 10 cents. Cable address, "Blacksmith," Buffalo.

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Arrangements will also be made with the secretaries of the larger associations to handle AMERICAN BLACKSMITH Subscription Coupons. Additional names of secretaries will be announced as these arrangements are completed.

Austin English, Secretary-Treasurer, Kansas State Association, Hutchinson, Kan.

A Lock Stitch Sewing Awl Free

Did you ever use a lock stitch sewing awl? If not you don't know how easily, quickly and strongly you can repair belting, buggy tops, dashes, harness, and in fact all heavy leather and canvas material. And we will give you one Myer's Famous Lock Stitch Sewing Awl if you will send us one new subscriber. That's not asking much. The sewing awl alone is worth the price of subscription and is regularly sold for one dollar.

The outfit consists of one handle and reel complete with waxed thread, two needles —a straight needle and a curved one—and a little combination wrench and screw driver. And full illustrated instructions are packed with each awl. It is one of the most practical devices ever invented and for the general smith it is a great time and labor saver. The awl is neatly finished and very compact, the needles and wrench being kept in the hollow handle which has a screw top. And you can get one of these awls by getting one new subscriber to "Our Journal." Get a brother smith to subscribe and ask for a lock stitch sewing awl FREE.

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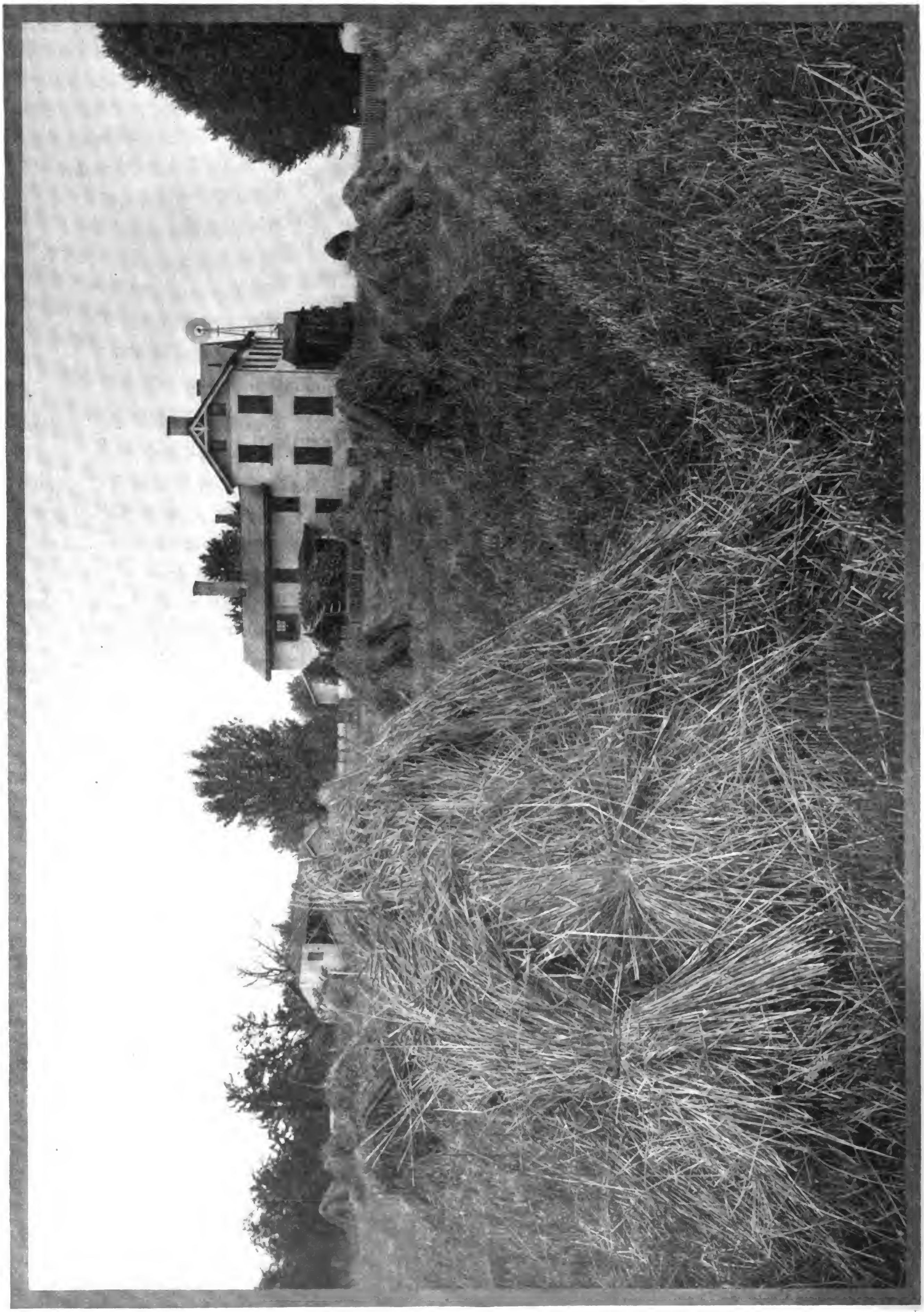
From Old and New Subscribers

Here are two letters—one from Ohio, the other from Iowa—they show that the new as well as the old subscriber knows the value of "Our Journal." It's not necessary to look through seven or a dozen issues of THE AMERICAN BLACKSMITH in order to know whether or not it is of value to you. This subscriber says: "Just received my first copy of the AMERICAN BLACKSMITH. It is certainly the paper for a blacksmith." And when the new subscribers say that is it any wonder that the old subscribers consider it almost impossible to do business without "Our Journal"? Here, for instance, is a letter that shows what the old subscriber thinks: "If the AMERICAN BLACKSMITH was to stop coming it would be the same as losing a friend. We have every number since No. 1." That gives you an idea of what the old subscribers think. And when it comes to a real opinion on the worth of a paper the old subscriber is best qualified. The subscriber who has read a paper month after month and year after year, has seen the paper grow from what must necessarily be a small beginning, has seen it improve and brighten, has seen its pages become more and more valuable—that subscriber is a competent judge—he knows. If the paper didn't grow, if it didn't expand and improve, that reader would never become an old subscriber.

If you are an old subscriber you know the value of "Our Journal"—you can tell that neighbor of yours what the paper has done for you. Get him as a new subscriber—we'll see that he becomes an old subscriber. There's not a man, no matter what part of blacksmithing he is interested in, who can't find something of interest and value in every issue of THE AMERICAN BLACKSMITH. Talk it over with your neighbor. Get his subscription.

The Pink Buffaloes

We have sent a good many thousand pink buffaloes scurrying across the country during the past few months. Did you get some? If not you should have some—you are entitled to them. And the new style seems to meet with everybody's approval. If you haven't seen the new style stamps ask for some today. Just say: "Send another herd of Buffaloes my way." And a postal will do.



Shoeing the Horse Correctly—2

J. C. Weaver

Relation of the Foot and Limb

As horses have well-formed and also badly-formed bodies, so also have they well-formed and badly-formed limbs. The form of the hoof depends upon the position of the limb above it. And as the shoer is vitally interested in the hoof he must take an interest in the limb.

To judge the limbs of the horse and the relation of the limbs to the feet it is necessary not only to observe the standing position of the limbs, but to observe the limbs in motion also. It is often observed that the horse does not always move as the standing position of the limbs would indicate. It is therefore necessary, in order to know the animal and to shoe him correctly, to observe him both at rest and in motion.

In examining the standing position of the horse observe the front limbs and feet from before and the hind limbs from behind. Then observe the animal from both the left and the right sides to judge of other irregularities in the positions of the limbs.

In the engraving Fig. 1, the diagram at A represents the normal or straight position of the front limbs. It will be seen that a straight line dropped from the shoulder passes down the middle of the limb, dividing each limb into two equal parts and meeting the ground at the center of the toe. This, however, is not observed in the diagrams at B, C and D. At B the limbs instead of dropping from the body in a straight line slant outward and the plumb lines fall to the inner side of the limbs. This is known by some authorities as the basewide position of the limbs. At C we have another position of the limbs, commonly known as knock-kneed. Here the knees are too close together while the feet stand wide apart. This is also known as the toe-wide position. In the diagram at D the limbs drop inside of the plumb lines. This is known as the toe-narrow position. These diagrams do not by any means illustrate all of the abnormal positions of the horse's limbs. There are modifications of these abnormalities. For instance, it is possible for an animal to have one straight limb while its opposite member may be of the position illustrated at C. Or both limbs may be of a knee-wide or bow-legged position. Thus it is necessary for each shoer to observe each particular case that comes under his care and to judge accordingly.

In Fig. 1 at E is a diagram showing the normal position of the limbs in profile

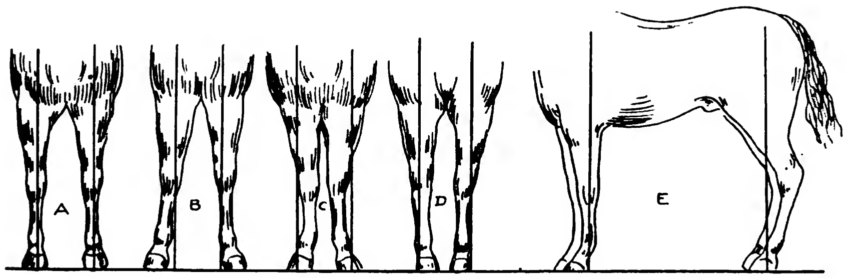


FIG. 1.—EXAMINE THE STANDING POSITION OF THE FRONT LIMBS FROM IN FRONT

It will be observed how the plumb-lines pass through the limbs. Abnormal positions of the front limbs show the plumb line bisecting the upper limb down from the shoulder to the knee, while from the knee downwards the limb inclines outward and forward, allowing the line to touch the ground somewhat behind the heel of the foot. Then there is the sheep-kneed position, in which the knee is thrown backward out of line. Other common positions are the knee-sprung position in which the knee is thrown forward out of position, and the standing-under position where the entire limb is inclined backward under the horse.

When viewing the horse from behind we find such irregularities as shown in Fig. 2. Here at F we have the base-wide or cow-hocked position of the hind limbs. In this case the hocks are too close and are turned in toward each other; in fact, the entire limb is turned. In diagram G the limb is also turned, though with a different result.

Now in observing the animal in motion over level ground we will notice that he throws his feet in one of three directions. These motions of flight are illustrated in Fig. 3. At H we have the regular or normal motion in which the animal throws his feet in a straight line from one position to another. To carry his feet in this position the animal must stand normally, that is his feet must be neither base-wide nor base-narrow in the standing position. If the horse stands base-wide, that is with the toes pointing outward, his flight will be as shown in the engraving at I. But should the animal's feet be of the base-narrow or toe-narrow position when standing he is most likely to carry his feet as illustrated in diagram J, Fig. 3.

It must be explained in this connection that a number of things will cause a horse to deviate from his regular or ordinary gait. For instance a horse that is tired will change his regular gait. Or if the horse is pulling a heavy load he will carry his limbs irregularly, even placing the foot on the ground differently. So it is absolutely necessary that the shoer, to be successful, must observe carefully not only the standing and moving position of the limbs and feet, but the condition of the horse as well.

(To be continued.)

Is the Horseshoer Responsible?

ANDREW MCLAIN

I read in the columns of "Our Journal": "Is a horseshoer responsible

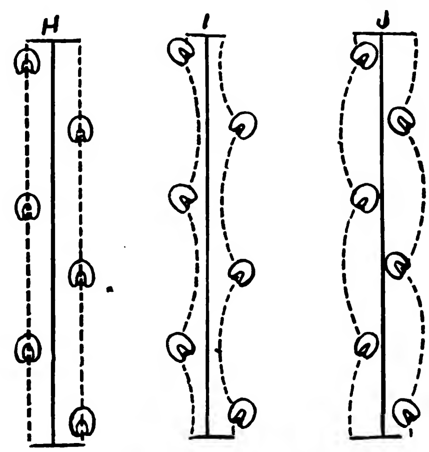


FIG. 3.—THE HORSE'S FEET IN MOTION

for accidents occurring to horses while being shod or while in his possession?" I say from legal authority he is not; in no State in the Union nor in any country in the world. Any broadminded man should know that much. I thought a horseshoer was posted on his business sufficiently to make it unnecessary to ask such questions. I am very sorry to learn that there are any brothers who don't know enough of law to protect themselves and their business. I hope no brother will misunderstand me. I don't mean to say I am an attorney at law or anything like that, but I will say I know enough to protect myself. Now, I say a horseshoer is not in any way responsible for any horse getting hurt, nor in fact, killed, nor can the horseshoer hold the owner of a vicious horse liable for damages sustained while shoeing the brute, as long as the owner has previously posted you on the ferocity of the animal. I am talking from experience according to the law. Now I will try to explain my experience. I killed six horses in my shop in six months—and you bet I didn't pay for one of them and never will. I try to be very careful handling bad horses, but I never get afraid of any horse no matter how mean he performs. I always concentrate all my efforts to show my superiority over a horse. I always say to the horse: "I will show you if an Irishman does not know more than the horse," and I mean it—every word. I am a small man in stature but big at heart. I have to be or I could not shoe horses. God help the poor horseshoer who lets the horse boss him. Brother Walters says some horseshoer had to pay for a horse that got its leg broken. There must be something wrong about this subject. I never knew of a Court of Justice returning a verdict against the horseshoer for breaking the leg of a horse, providing the horseshoer was not at fault. The law says the owner of the horse must by all means post the horseshoer on a bad horse, after that it is the horseshoer's lookout. The shoer should make clear to the customer the extent to which he (the shoer) is responsible. Call the attention of the customer to the printed notice in the shop. The poor horseshoer should say to the customer: "Please read my notice hanging above your head." Here is what it says:

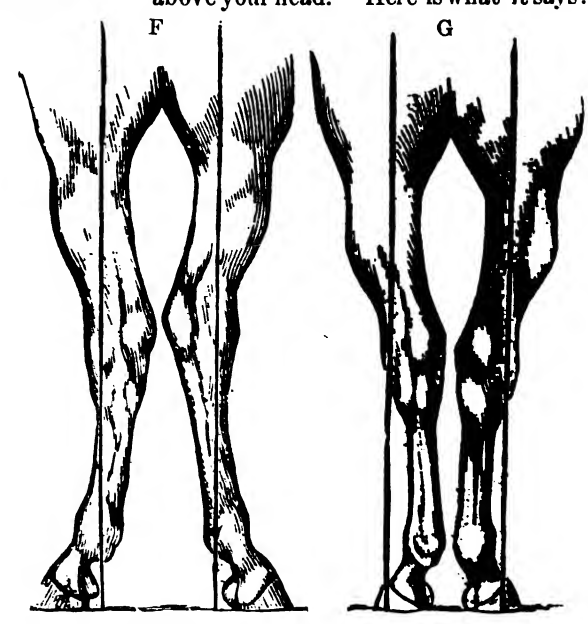
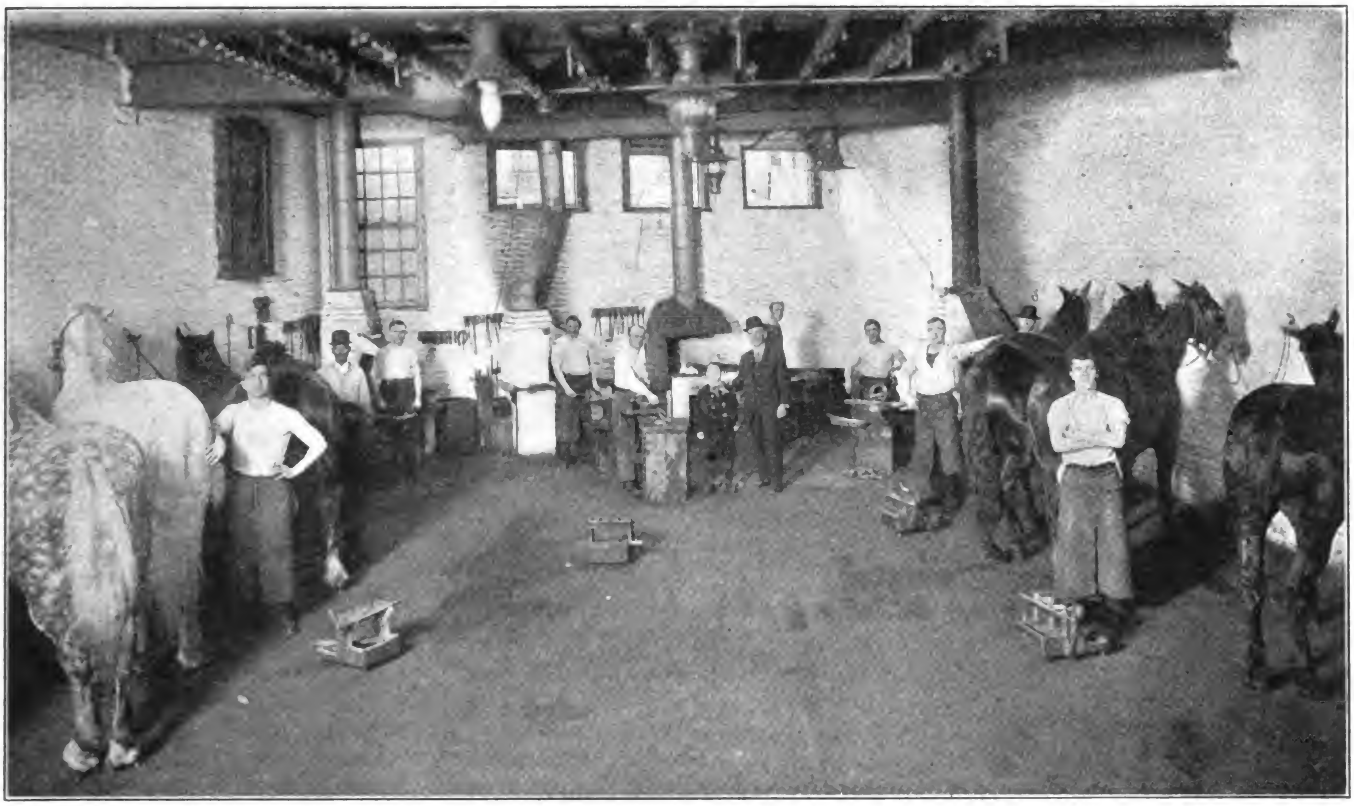


FIG. 2.—THE HIND LIMBS ARE VIEWED FROM BEHIND

NOTICE
I will not be responsible for any accident occurring to horses while going to or from the shop or while in this shop.
By Order of
· Andrew McLain, Prop.

This fills all requirements of the law in any State of the U. S. A. or foreign countries.

I read about horseshoers right along having to pay for hitting a horse or breaking a leg, but on the other hand I cannot see where any of my brother horseshoers are getting damages for getting hurt or killed and this is a daily occurrence. A coal company sent a mule, or in other words, a man killer (the latter is the proper name for the brute) to have me shoe him. The company neglected or refused to notify me as to the viciousness of the mule. I did not know the mule was dangerous, and while I was in the act of walking to him with a shoe in my hand to fit on the foot he sprang squarely on top of me and laid me out for some time. It was not my fault he hurt me because I was not informed that he was dangerous. Had I known he was dangerous he would never have had the opportunity of hurting me as I would have inserted him in my stocks which I have for that purpose. Well, my men put him in the stocks and shod him after he pretty nearly killed me. I charged the company $5.00, and beside sued them for $5,000, but the case has not come up for trial in court yet. So this once the mule got the best of an Irishman (that's myself). He knew he was a devil, but I did not, for he gave no warning. He watched his chance to give it to me and this was once the Irishman didn't show the mule up. I was laid up for some time and could not work, but the company did not consider me at all. Never once did they send a representative to see whether I was living or dead. That goes to show how they care for a poor horseshoer if he doesn't take care of himself. Hoping this will be of some good to my brother horseshoers.


A NEW JERSEY ESTABLISHMENT THAT MAY WELL BE CALLED A MODERN SHOEING SHOP

A Modern Shoeing Shop

S. M. Couch

The accompanying engraving shows the shop of Mr. P. Powers of Newark, N. J. Mr. Powers came to Newark from Syracuse, N. Y., in 1903, and bought out a shop on Atlantic Street, employing two men. His business grew until he finally moved into his new place. The men shown in this picture are all permanently employed. In addition to the fires shown in the picture there is one in the basement where one man works getting stock ready. There has been no month since he started that his business did not exceed the business of the same month of the year before. His success has been attained by close attention to business and high-class work. Mr. Powers is shown in the picture with his grandson by his side. The front of this shop is of white brick and looks like a bank. I am sorry the picture does not show it.

Shoeing a Horse to Make Him Pace or Trot*

Lester Wallace Sims.

Is there any way of shoeing a trotting horse to make him pace, or of shoeing a pacing horse to make him trot?

I would answer most emphatically, YES. But to establish facts satisfactorily and clearly will require some space for illustration, comparison, etc. And in order to reach the conclusion that the correct analysis of the problem is answered in the word YES we will, therefore, concede everything to be to the contrary, which, by causing all the finer points to be brought out, will be plain and more thoroughly understood.

Much of the public mind and opirion holds that pacing horses are all shod light and that there is really a very marked and distinct difference between trotting and pacing shoes. This is a strong belief, as it is no uncommon thing when ordering a horse shod for a man to say: "I want to try a set of trotting shoes," or "A set of pacing shoes." Seemingly they believe that shoes come tagged and labeled with full instructions, and that if a horse gets a particular brand he will carry out instructions and go on a trot or a pace according to the brand he gets. If the shoer bears the distinction of being an expert in the art he may then be expected to shoe an old horse that was never known to go out of a walk and to make him go right off on a pace and vice versa. Of course, it is needless to say, that to expect such a feat is nothing short of ridiculous, and is as far from being possible and as far from real facts as the east is from the west. Some who are more thoughtful and perhaps have read a little on this subject will say "when I want to change a horse's gait I always shoe light in front and heavy behind." Again, most professionals and men really experienced in gaiting and balancing action, will readily agree that no two can be shod alike, and that there are no fixed rules or system by which to be guided or governed. All this is a notion, and best explained in this way. The veteran trainer, Mr. John Splan, was having a horse shod when the owner piped in, "I have an idea of certain changes," after which Mr. Splan gave him a look, at the same time saying, "Reasoning thought fathers an idea, that is all a notion."

A Perfect System

I claim a perfect system to exist, and fixed rules by which to be guided and governed to a certainty. To those who oppose this view will say: "Perhaps you have employed no rules or system." If you have and it has failed it is because of employing the wrong system or methods. When a man says no two can be shod alike he is simply saying that the conditions are not the same, or the results would be precisely and exactly the same; all of which must be charged up to causes and effects. It is all a matter of common sense backed by experience and good judgment. Nothing mysterious, no spooky business, as some would have it appear. One more point I wish to make clear, suppose we call a man to examine a sick horse; the conditions are very abnormal. What can we expect if the man knows nothing of normal conditions? Further, how may we expect a man to balance a horse if he doesn't know when he is unbalanced, and vice versa? Here we present the key that shows one through the whole works—to get a horse to go a certain gait, first balance that gait. To change that gait simply unbalance it. This means a radical change and the reversal to extremes of what existed.

Now compare two subjects. First: a young horse double gaited goes on a trot and a pace at random. He is to have some regular handling and we wish to establish a fixed gait—the trot. We shoe him with heavy shoes in front and light shoes behind. This proves a success and in a short time he shows no disposition to pace. The trot is a fixed and balanced gait. Now the whole secret of putting on a set of pacing shoes lies within this one fact; simply unbalance the trot by the reversal to extreme of weight, light shoes in front and the heavy ones behind. He naturally shifts from the trot to a pace, and as this gait is established, no doubt, will require some change to balance for speed as a pacer.

THE SHOP OF MR. BYRON M. EVANS OF OHIO

A four year old mare by Star Pointer, 1:59¼. The owner said that as he had a good man they would break her up at the farm and get her seasoned and gaited before bringing her down to me at the training track. They proceeded. Finally I inquired. He said, "breaking fine, going to have her shod tomorrow." And so he did like many others would do under the circumstances; he had eight ounce shoes in front and eleven ounce shoes behind, expecting, of course, to balance her, for she was shifting back and forth from trot to pace and from pace to trot, and could come as near as the next one to changing her gait a hundred times in a hundred yards; but, I knew nothing of this until he finally sent her down to me. After I had jogged her once, I then shod her with fifteen ounce shoes in front and five ounce shoes behind, and in a week's time she was a good smooth pacer. After a little more training I added a three ounce toe weight to speed her and she could show a 2:10 clip. Comparison: Now we have a trotter and a pacer balanced alike. Now reverse the weight on them both. The trotter will shift to a pace and the pacer will shift to a trot. If then, in the beginning, this was the gait desired we would then have shod them in this way as they are now shod. Again, this fact has caused more than one trainer to get the "Hoss Laugh," and leads many to the conclusion that there is no rule or system. In training a pacer that goes badly and unsteadily the trainer gets disgusted, concludes to try him as a trotter. He goes to the shop and gets more weight on him; when he goes out for a trial, of course, expecting him to trot, the scamp is a regular pacing machine. It has occurred that because a trotter carrying weight goes badly it is decided to make a pacer of him. The weight is reduced and is just the making of a good trotter. They are just accidentally balanced; there's nothing wrong with the system.

Again, I repeat, how may we expect a man to balance a horse if he doesn't know when he is unbalanced? Brown Hal 2:12, was the head of that famous family of pacers, the Hals, of Tennessee, (of which Hal Pointer 2:04½ and Star Pointer 1:59¼, the first harness horse to beat two minutes are direct descendants)

which, while strictly a family of pacers, were by no means easy to balance. Many of them toted considerable weight. Brown Hal carried well over twenty ounces on each front foot to balance him as a pacer, and if shod light in front he would trot. This should be enough to explode that NOTION that pacers must be shod light. They must be balanced, and this Mr. Geers does, and drives no hopple ones. But many trainers, unable to balance horses, have appeared on the scene with a hopple one.

Food for Thought

"Nancy Hanks" 2:04, one time queen of the trotting turf, and her trainer (then Benj. Kinney) had an awful experience. He had to chase her over plowed ground to get her to find a trot, but when she did, and that gait was balanced, the world knows the rest of the story. Another champion, "Smuggler," a born pacer, was trained and raced on a pace and never trotted until he came into the skillful hands of Chas. Marvin. To get this horse to find a trot he was worked in a short circle so as to compel him to trot. Then the added necessary weights straightened him out and he beat "Goldsmith Maid" at Cleveland, Ohio, in the greatest race ever trotted up to that time. He was sold at one time for nearly fifty thousand dollars. Again, the records will show that a three-year old colt, "Reno's Baby," won two races, one trotting and one pacing race, both in one afternoon, and in very remarkably fast time. He carried toe weights to balance the trot. When the toe weight was removed he would pace. Another interesting subject is "Peter the Great," at present attracting so much attention as a sire of phenomenal trotters. To balance him, and when he was at his best and a great race horse he wore no two shoes alike to balance him. The first horse to gain a double record beating 2:10 was "Jay-Eye-See," first 2:10 trotting and then 2:06¼ pacing; and then "Anaconda," first 2:01¾ pacing and 2:09½ trotting, also "Heir-at-Law," with a double record averaging about 2:05.

It is reasonable to suppose that these horses had to be perfectly balanced to accomplish such a feat. They were unquestionably shod to make them trot and to make them pace. While it is often necessary to assist a horse in finding a certain gait, one that he has never known; if he is properly shod and balanced it will become a fixed and established gait, which is after all, nothing short of shoeing them to make them trot and to make them pace. This undoubtedly can be accomplished with most any horse (except cripples or what are known as dummies) and the measure of success will depend entirely on that all powerful thing pronounced in the word ABILITY.

Horseshoeing Shops and Supplies in Africa

Some Interesting Items Taken from the Consular and Trade Reports

Abyssinia

While horses are used to a considerable extent in Abyssinia by all classes, the natives do not shoe them, preferring the sure-footed mule in bad weather and for long journeys over the mountainous trails. The Abyssinians do not as yet see any advantage in the practice, and while a few of the small foreign population take advantage of a horseshoer (an American) in the capital during the rainy season, the majority prefer horses unshod during the dry weather from October to June. The supply of nails and shoes is uncertain, only small quantities being imported from India, and these of poor quality. Charcoal is used in blacksmithing, owing to the high price of coal, which must be transported a distance of some 90 miles by caravan to Adis Ababa.

Algeria

The tools in use are pincers, foot scoop, parer, beetle, rasp, riveting hammer and awl. The shoes, nails and iron are secured from France, and coal from England.

Morocco

The horseshoer himself does not bother with the first fashioning of the shoes; he buys his shoes rough-hewn from the blacksmith, who buys the crude iron from Europe (usually Spain) and makes the shoe, which he retails to the shoer for about 20 cents American per set of four. The horseshoer hammers them into better shape without the use of a fire and cleans up the nail holes which have been roughly put in by the blacksmith. The tools of the horseshoer are of the simplest kind: An anvil, the size and shape of a ten-pound sledge hammer, a blunt-headed hammer, a peculiar shaped awl, a short, thick punch and a small fire shovel, which is really a sort of chisel to cut or pare off the hoofs of the animals. If the shoer finds himself unable to make use of old nails, which are always carefully straightened out and used again whenever possible, he uses new nails. European nails are coming more into use, but it is difficult to replace anything in Morocco that has been used for centuries.

Tripoli-in-Barbary

The tools generally in use now are a cheap German make, bought locally. In former times the Arabs forged most of their own tools, but they find now that the saving is not great enough to warrant it and they can buy a tool with a much better finish than they can put on at a cost very little above the price of material and labor. They do not use many tools, the hammer and file being their mainstay. The supplies are imported and are bought from local merchants by the smith. They burn charcoal in the forge, coal being very little used here. Two qualities of iron are used, one costing (June, 1910) 120 piasters ($4.51) per kantar (113 pounds), and the other, 55 piasters ($2.07) per kantar. The nails cost 6 piasters (22.5 cents) per oke (281 pounds).

Egypt

Horseshoeing in Alexandria differs but little from the American method. There are two classes of shops, Arab and European. Both, however, follow the same system. All the shoeing supplies, such as shoes and nails, are made in the shops from Belgian iron. Coal is imported from England. The shops are fitted with forge and bellows and the usual tools of the trade.

MR. W. A. ROBERTS OF ARKANSAS ALSO DOES AUTO WORK

In Cairo, shoeing supplies, including nails, are made by the government workshops or by the natives themselves from the old iron which is melted down and converted into nails and shoes. Coal and coke are both used in furnaces, the coke generally coming from Great Britain. The characteristic tool used is a native instrument for paring hoofs,

AN OLD DUTCH CHEST OF IRON WITH PAINTED DECORATION

which is gradually being abandoned for European knives.

South African Union

The shops in Durban present an appearance similar to that of the American village blacksmith shop of fifteen or twenty years ago. There are the forge, the flame in which is kept aglow by had bellows, the slack tubs and the usual hand tools, anvil, strips of iron, specimen shoes, etc. Only hand tools are used by the farriers, practically all of American make, and are the same as were found in the American shops a number of years ago. No machine tools of any kind have been introduced. Among the tools in use are rasps, hammers, buffers, toe knives, pincers, foot cutters, stamps, tongs, knives, heel cutters, pritchels and fullers. Ready-made shoes are imported and are the ones almost universally used for road and general purposes in Durban and Natal. The imports of shoes in 1909 amounted to $14,185, of which the United Kingdom supplied $10,681, the United States $3,382, and Sweden $121. The American Cowboy shoe is slightly more expensive, but gives better general satisfaction in wear. A great difference was discovered in the manner in which this trade is served by the British and American manufacturers. The American packs his shoes in kegs which contain all fores, while the British manufacturer ships his in bags containing an equal number of fore and hind shoes. The nails used are all of British make. The iron for hand-making shoes is imported from British and American mills, but the quantity imported is insignificant. Coal is from the Natal mines. There is no complaint found here against the American shoe either by the user or merchant, although merchants hoped that the prices might be reduced, as they are slightly higher than for others.

The tools used in Cape Town are principally of British manufacture. In repairing, the drills and tire benders used are in many cases of American make. The principal source of supply for horseshoes is England. The "Guest" shoes are popular on this market. Many of the farriers make a large proportion of their horseshoes. Horseshoe nails called the "Globe" are used principally and are manufactured in Sweden. The iron used is principally from England.

The tools in use in Johannesburg are principally of American manufacture, including hoof parers, clinching tongs, riveting clamps for sand cracks, and buffers, pincers, etc.. Of the shoes used the British and colonial are most in demand. Chillington's (hand-made) are in fair demand, and American Cowboy, good demand. For all ordinary work machine-made shoes are used. Of nails, Mustard's are in greatest demand, and Globe, Butman, and Standard in fair demand. Netherton Crown iron is mostly used. Carnegie has just come into the market.

At Bloemfontein ordinary farrier's tools are in use and American B. & C. shoes and English B. & C. shoes are used. I am informed that the American is considered too narrow. The American make of Globe nails is generally considered the best.

British West Africa

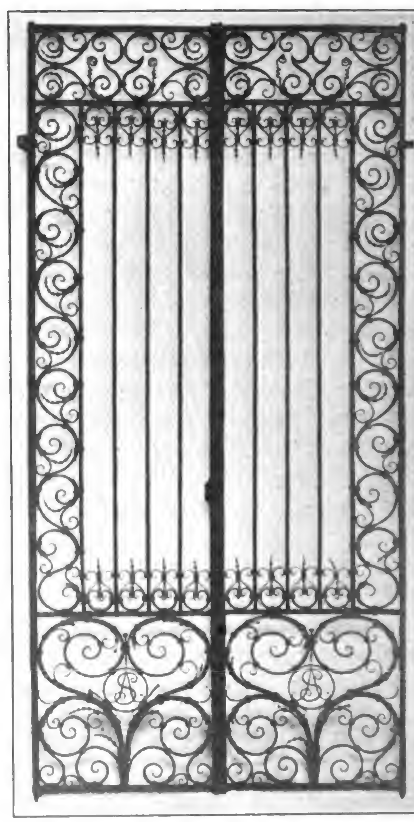
There is practically no horseshoeing done in British West Africa, as there are few horses or mules in use. Whenever any shoeing is done it is in the ordinary job blacksmith shops, with no special tools. In other British Colonies, the Gold Coast, Gambia, Southern and Northern Nigeria, especially in the latter two, horses are in greater use than in Sierra Leone, and some shoeing is done, but in ordinary shops with no special tools. Such horseshoeing is generally done in the government repair shops.

Portuguese East Africa

There are only about half a dozen horseshoers here and they have no regular workshops. A cavalry regiment at Lourenco Marquez has its own shoer. Horse shoes are not made locally and are imported from abroad. The neighboring colonies of Natal and Transvaal furnish almost all the shoeing supplies.

Mauritius

An anvil, bellows, a heavy hammer, some smaller ones, pincers and tongs of ordinary kind are the usual tools found in the primitive shops. In the outskirts and the country districts the artisan is content with an open shade in which to do his work. The shoes are fabricated in the shops. Iron bars are purchased from the iron mongery, heated and worked out. The coal is



A WROUGHT IRON GATE OF THE FOURTEENTH CENTURY

also purchased from the firms as well as the nails. Attempts, I understand, have been made toward introducing in Mauritius horseshoes manufactured abroad, but the venture proved a complete failure.

Zanzibar

With the exception of the shoeing establishment in the Sultan's stables there are no workshops in Zanzibar, and outside the carriage workshops in the Sultan's stables there is only one carriage repairer in the town. There are two so-called farriers in the city who have no shop. The shoeing establishment in the government stables is under the direct supervision of the government veterinary surgeon, but the methods of the other two are primitive. They do not make shoes to fit the horses' feet, but cut the hoof to fit the shoe they happen to have. All shoeing supplies, nails, iron, etc., are imported from British India.

A Simple Smith Shop Credit System

O. R. Manville

I use a very simple credit system in my business and believe that readers of The American Blacksmith will be interested in an explanation of how it works.

I use charge slips like the examples in the engravings. When a customer asks me to charge his work I make out one of these slips. I then ask him when I can count on my money, and I put down the date, and I let the customer see that I have put it on his charge slip. Of course, whenever possible, I get the cash, but it is often necessary to do work on credit, and a good many good customers prefer to have a charge account.

These slips I keep filed in proper order according to the date promised for payment. Then each morning I go over my file and send statements to those customers whose accounts are due. The thirty-day customers I post up in my ledger every night. I do this after work. My hands are clean and my books look neat and nice.

I have now been using this system for three months. I never let a man go over time. He gets a statement when his account is due, and if he does nothing about it further credit is denied him. In this way I lose but a small bill instead of a large one if he is not honest.

In the old system the smith put a job down in the book and unless the customer brings his bill to mind or unless the smith goes through all of his book accounts every week he loses track of the accounts that are due, and that ofttimes allows them to grow old and soon forgotten.

In my system each day's business is gone over at regular intervals, the due accounts come up for attention at the proper time, and in this way bills that are due are always in mind.

This simple system can be adapted to most any smith shop business and will take no more time, after you get used to it, than the old method.

MANVILLE'S BLACKSMITH SHOP

Breckenridge, Mo., 3 — 18 1911

WORK DONE FOR

Mr J. Bensley

Value Received

Buggy	4 tire set	2,00
Spring Wagon		
Wagon		
Shoeing, new		
" old	2	40
Farm Work	1 plow sharpened	25
	spring seat	50
		3,15

To Be Paid 3-25 1911

Short Settlements Make Long Friends.

MANVILLE'S BLACKSMITH SHOP

Breckenridge, Mo. 3-16 1911

WORK DONE FOR

Mr H. Weber, livery barn

Value Received

Buggy		
Spring Wagon		
Wagon		
Shoeing, new	2	75
old	1	20
Farm Work		95

To Be Paid 30 days 191

Short Settlements Make Long Friends.

A SIMPLE FORM THAT CAN BE USED IN ANY SMITH SHOP

Some More Smithing Business Occurrences

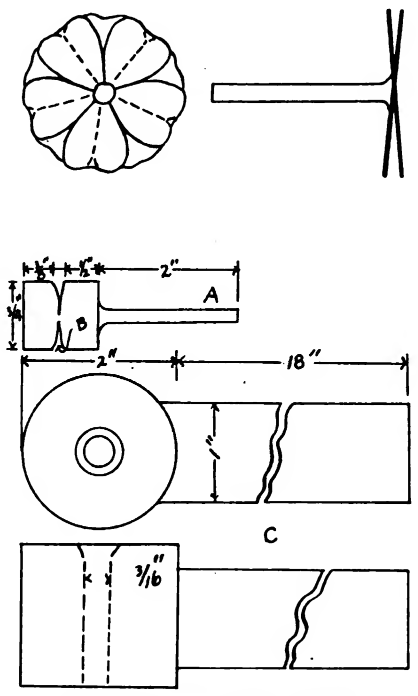
Andrew McLain

In answer to Brother F. Underwood, of South Africa, as to methods perpetrated on the smith. Now, knowing he hailed from the British Isles he is excused. I hailed from that country, shod horses for seventeen years over there and did some general blacksmithing. I came from the City of Belfast, Ireland, and have worked all over the three kingdoms, so I have seen some of these things Brother Underwood has mentioned. I remember an instance which happened in a shop in England. A customer who came in to have his horse shod had an old smoothing iron (you know what that is made of). I was a new man in the shop and had never seen a man bring a smoothing iron to a horseshoer before. I called the boss to one side and asked him if that was the kind of material I was supposed to make shoes of. He said to me: "That's nothing. When you are here awhile you get used to that. The people around here are liable to bring a whole sack full of madden heads for you to turn one set of shoes from." I turned to him and said: "Well, if they bring madden heads, I can make a better job out of them

than out of the smoothing iron." Well, I proceeded to make the shoes out of the old smoothing iron. I got it pretty hot and told the man to hit it with a hammer and to draw it down himself. So he did. Of course, you can imagine what happened—he got burned all over the head and hands. That settled that business. It is awful the way some poor smiths are imposed upon by ignorant men (this is a good enough name for them). I allow no man to handle my tools, nor any man to meddle with the fire. I allow no monkey work in my shop, not even from the best friend I have. I never lift my hammer except for pay. I run my shop on a consideration and it must be considered. I want pay for every time my hammer goes up and down.

All this dirty business that is put upon the horseshoer is his own fault. He lets the world know too much of his business. I never allow my customers to know my business. A horseshoer has no business giving his ideas to customers. The horseshoer is supposed to produce his ideas by his hands and get paid for them. That's just what I do. I have heard a horseshoer talking for an hour about shoeing a horse the customer was going to bring to have shod, and the next day the same man brought the horse to my shop to have him shod. He asked me no questions, but had the horse shod. Now, you see this other poor horseshoer gave him so much information and did not get the job. I tell them nothing and shoe the horse to suit myself, and if my work does not suit he is at liberty to go where he pleases; he will do that any way. I've been in the business for thirty-five years, and any man or horseshoer who knows McLain will tell you "Don't say anything to him when you go to his shop to have a horse shod: don't tell him how to shoe the horse or he will never shoe him for you." When you post a customer on your craft he knows as much as you do. Where do you come in then? Think this over. Now, I am not criticising all the horseshoers on this point, nor any of them, in fact, that is their business. I am only speaking for the welfare of the poor horseshoer and blacksmith. Gentlemen, how much information will you get for nothing from a lawyer? None at all. He says to you before you talk to him very much. "Pay the Retainer."

Eight years ago last Labor Day a representative of an oil trust came to my shop to have two broad axes and two briar scythes and two sickles ground on my grinding stone, and wanted their own men to do it. One of the men asked me what I would charge for the use of the stone. I told him this was Labor Day, and I was not working, but I would let him in the shop to grind them, providing he paid me fifty cents apiece and did his own grinding. He said it was too much. I never spoke to him, but walked away. So the foreman hunted me up and said if I allowed them to grind the tools he would pay the cost. "Well," I said, "If you want to do your grinding, it will cost you eight dollars in United States Money." They sharpened them,



HOW THE ROSE WAS FORGED

but remember, not before I was paid eight dollars. The paymaster said he never knew of a case like that before—such an exorbitant price. They had been used to getting the poor blacksmith's grinding stone all over the United States of America for nothing; but you have to pay dearly for the oil you burn—mighty dearly.

Copying Nature in Iron

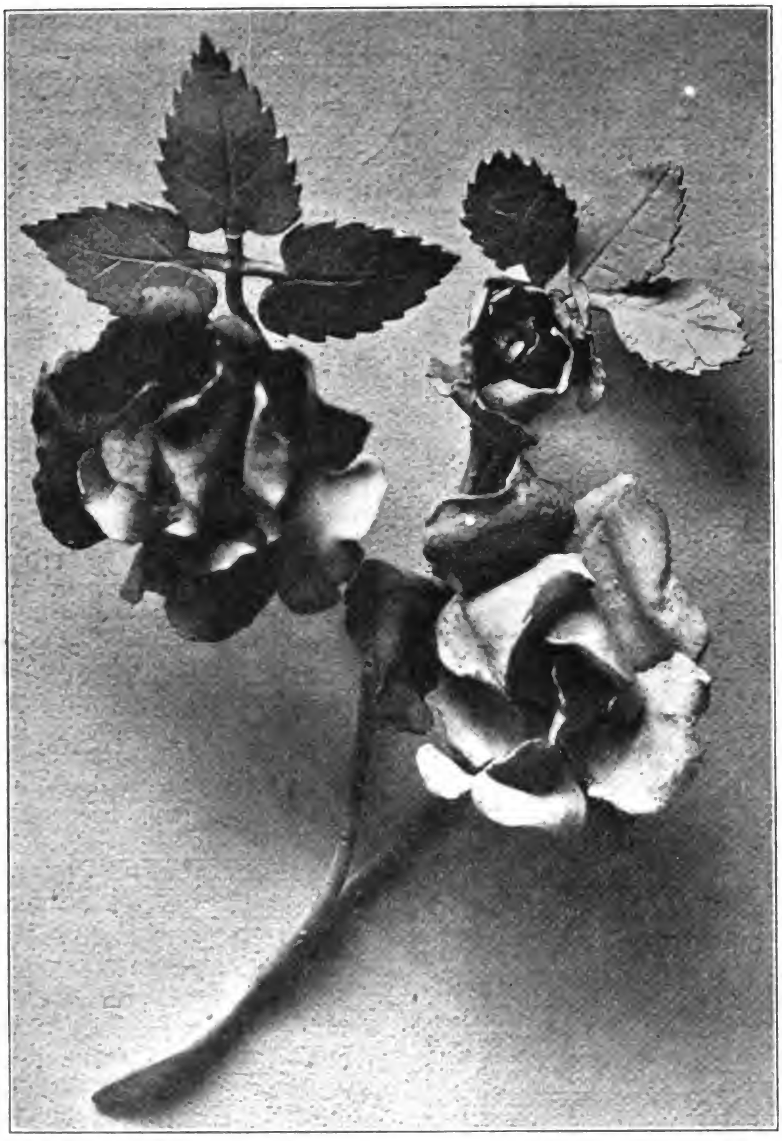
JOHN A. CURLEY

The designing of ornamental iron work devolves to a great extent upon the iron forger, not only in small shops, but in shops where they have competent draughtsmen. The lines in a drawing will seem to harmonize, but the completed work will not, and where this occurs it is left to the forger to remedy the defect. In many shops the designing of ornamental work is left entirely to a competent blacksmith. It is hardly necessary to say that this class of work requires skill and artistic ability. An article in THE AMERICAN BLACKSMITH of November, 1910, written by Mr. Thomas Googerty, had many good points on ornamental iron work, but the writer cannot agree with him when he says "Designing is not the mere copying of things in nature; we simply use things in nature as a motif to get our ideas. Wrought-iron designs should not follow nature too closely, but on the contrary must be conventionalized. It is not good form to try to represent natural flowers in design of any kind; represent only the characteristics." Nonsense! Why is it bad form to *try* and represent a natural flower or vine in iron? It may be convenient to conventionalize, *if* the workman has not the ability to reproduce a certain object of nature. There is no workman who can forge a duplicate of the flowers, etc., of nature, but that is no reason why we should retrograde. We may copy from nature, and no matter how skillful we may be we will find defects in our work, and actually have only the characteristics of the object. The accompanying photograph shows an ornamental piece designed from nature. It is made of three-quarter inch Swedish iron, and consists of five distinct pieces. Each rose is forged from one piece, as are also the bud and leaves. The following method was used in forging this piece, which required six hours' time:

Fuller down, draw out and cut off to dimensions given in engraving marked A. With thin cold chisel cut around at point marked B, so that only one eighth inch holds the two sections. Have heading tool like one marked C, heat the piece and smear the cut with lead. This will prevent the sections from welding. Repeat and place in heading tool and forge down flat. Care should be taken in first heat to strike square blows. Do not hammer until cold, but repeat as often as required until proper thickness is obtained, about one thirty-second of an inch in the center with edges about one sixty-fourth of an inch. With a thin chisel the two sections can be spread apart and split down to center as shown in sketch, and after petals are of proper shape they can be bent and rolled with round-nosed tongs or pliers. The stem will be long enough so that heat can be taken between tongs and rose, and

the stem drawn to required size and cut off, as shown. The leaves are forged down in the same tool, only one section of iron being required on stem, however, and the bud should be worked over in forging down to thickness so that it will be on one side of stem. After working to shape, a small diamond-shaped chisel can also be used to raise thorns on stems of roses. The separate stems can now be welded, but if it is desired to place leaves close to roses they should be brazed on.

The forging shown in photograph weighs five ounces, and the roses are two inches and two and one eighth inches in diameter, the bud is one and one eighth inch in diameter. The large leaves are one and one eighth inch by three fourths of an inch, and the small ones seven eighths by five eighths inch. To photograph this piece properly it was necessary to paint it a uniform color. This paint has flaked off some parts of the piece and accounts for the scaled appearance of some of the leaves.



COPYING NATURE IN IRON

Those Damascus and Toledo Blades

L. R. Swartz

I remember having read in the columns of "Our Journal" some time back the query; "Why can we not make blades of steel like the old Damascus and Toledo sword blades?" Having no personal experience with any of those famous old blades, and believing but little in the fabulous tales of the marvelously keen edge and wonderful cutting qualities of those blades, still I take it in the main that they were really of superior material and workmanship.

My grandfather, James Pryor, was an iron founder in his day, and was one of the last of the old style of founders who made iron in the old type of charcoal blast furnace. He was actively engaged in the making of iron for fifty years, and in his time was considered an expert in that business, often planning and superintending the erection of the furnaces which he afterwards "blowed"; for in most places an iron founder was called a furnace blower.

His experience led him often to state as one of the principles of the business that "the more refractory the ore, the poorer the iron." This he accounted for by the higher temperature required to reduce the foreign matter, such as sand and spar, to a fluid state, so as to allow it to run off from the iron in the form of cinder or slag. These high heats destroyed the grain and tensile strength of the iron, rendering it short and brittle in the grain when it was afterwards converted into castings or wrought-iron bars.

When we compare the quality of old fashioned charcoal iron with that of the coke and anthracite furnaces of today, we can easily conceive that there would still be a corresponding difference in quality of the output of the charcoal furnaces of say from twenty-five to one hundred years ago and the still cruder furnaces of the remote past with their lower temperatures. Iron is being made today from ores that it was impossible to reduce in the hot blast charcoal furnaces of my grandfather's time, and so he was able to reduce ores that were impossible at earlier dates, so that the farther back we go into the history of iron and steel making we find a softer, tougher grade of pig iron being used as the material from which wrought iron or steel bars and steel tools were made.

Labor was not so valuable then as now, and plenty of time was used in the manipulation of the crude material before it became the finished product. The reason why the products of the old forges were not more uniform is that then as now some men understood the theory and practice of heating and forging better than others. Some iron, as a matter of course, was so handled as to prevent the best possible results.

The story is about the same when we compare the ancient with the present processes of converting iron into steel. During the middle ages the art of iron founding was not much in advance of that in Africa or Central Asia today and, I presume, the output not much greater.

Under present conditions I very much doubt whether it would pay to make Damascus or Toledo blades as the old

masters did, even if we did know how. Observe, for instance, how modern conditions have made necessary both quicker and cheaper production.

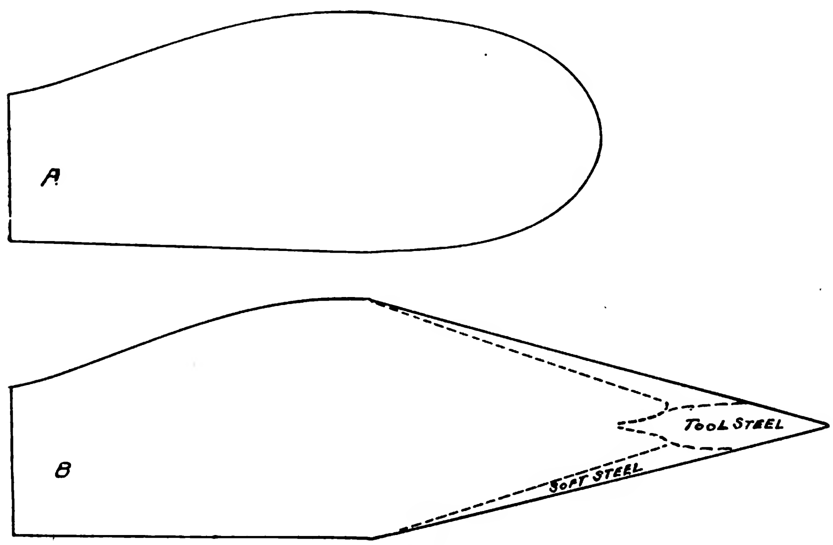
The Smiths of Yesterday and Today

Bert Hillyer

A few years ago, when most forgings were made of iron, a car load of soft steel came to the shop. All the old smiths held up their hands in horror, saying that if you got it hot enough to weld it would go all to pieces, and that it was a stiff, contrary thing to bend, and must be cheaper than iron or the company would not buy it. After these same smiths had worked soft steel for a while they could not work iron. If they picked up a piece of stock to make a forging and it happened to be iron they would throw it away in disgust: "I can't use that! if I do it will all split up in forging, and it wont stand the bending." After which remark they would move a ton of iron to get ten pounds of soft steel.

In the old days in working iron if the piece was large there were two smiths required to do the work; the smith who was working the iron and the smith who worked near him, the latter being required to take heats, welding one piece on top of another until it was built up to required size. The smith would be standing among a shower of coals with a long poker in his hand punching small pieces of hot coke down to the bottom and straining his eyes to see the heat. When the critical moment arrived—that is the time for taking out the stock—he would yell to the other smith. Then there would be general excitement around the shop. Helpers got busy and the rest of the smiths stopped work for a minute to see what kind of a heat Joe took for Bill. If things didn't come out right, there were things said that were warmer than either of the two heats.

Now in contrast to this take the smith of today. He selects a piece of soft steel from the rack, takes a pencil and computes the number of cubic inches in the finished forging, what the distance will be between the two hubs or bosses, and marks this down on the bar. He then heats his piece, takes in to the steam hammer, fullers it and most probably draws down to size in one heat. At one time it was thouhgt that muscle was the only requisite to be a blacksmith. Now it is conceded that brains are necessary, and there is not a good blacksmith today who is not fully equipped with both.



REPOINTING STEAM SHOVEL TEETH

Repointing Steam Shovel Teeth

T. H. Wheeler

The engraving shows a steam shovel tooth before and after repointing. At A is the tooth as it is brought into the shop. We have a steam hammer and a crane to help us in this work. Our first step is to prepare two pieces of soft steel stock, 1½ by 4 inches, and cut them 9 and 11 inches long. After drawing down one end to weld back on heavy part of tooth get a piece of tool steel, 8 inches long and 1½ by 4 inches. Get enough of these pieces for two or four teeth, or as many as we have to repair at one time. In doing this work don't be afraid of the fire. Weld the soft steel to the heavy butts, split them open and put in the tool steel in the center. Throw them aside until the next day, as they are too hot to handle the same day. Then heat weld up solid and draw to a point, in order to handle the 1½ by 4-inch soft steel. Weld a rod about 1⅛ inches thick, 4 feet long, onto the heavy end, with which to handle it. We use two fires for this job, one in which to heat the tooth and the other in which to heat the piece. Four men are needed; two at the fires, one to help them if necessary and one to run the engine and to do the welding. If any reader knows of an easier way of doing this I will be very glad to hear of it.

These teeth are used on a bucket. Four of them on one bucket. They dig into the bank and fill the bucket with ore-bearing rocks. The bucket holds 1¼ yards. Contents of bucket are dumped into the car and then hauled to the washer.

Setting Tires by the Cold Process

Geo. B. Gruber

Yes, I believe in setting tires cold, because I can boast of having no little experience in setting tires both hot and cold. I am the junior member of a firm composed of three brothers who run a wagon works established almost a half century ago. We are the descendants of the Gruber who created the famous Gruber wagon, known in almost all of Central Pennsylvania. We have the works fully equipped with the latest improved machinery made. We turn out at the present time a couple of hundred new jobs (farm wagons only), and beside do a great quantity of repair work, especially tire resetting on old wheels.

For some twenty odd years I set tires the old way by heating them—did not know any better—until one John Bouvie came along and sold us the famous West hydraulic cold tire setting machine. This was three years ago. This machine is not the cheapest, but it is the best made and, mark you, it does all that is claimed for it. Now, according to Mr. W. K. Huff, of Kansas, in his statement in February number, he does not believe a tire can be made smaller, when it is on the wheel, with the machine. Yes, that is the secret of the machine. If the machine wouldn't do that it would have no principle at all. This West machine does still more. A tire can be made perfectly level and straight in it. Simply start up your machine and, as soon as the dies take hold at the tire, stop off your machine

and strike down tire where it is up. After the machine has again shrunk the tire in the least bit it stays straight and the result wil be a nice job on an old or new tire. I say this cold tire setting machine has the same place, or should have the same place, as a self-binder in a harvesting field. But note that you are apt to do poor work as well as good work with either machine. The operator has to furnish the brains and the machine does the rest. You ask a farmer if he would like to part with his machine The answer will be: "Under no circumstances will I do without it." That is the way I feel about cold setting. I would sooner quit than set tires the old way.

When a customer comes with wheels, I first look them over thoroughly to ascertain if the spokes are loose in the rim, the tenons too long or rim bound. If the tenons are too long I am not slow to take off the tire, wedge up tenons and chip them down. But if the wheel is rim bound only, I need not take the tire off; simply take off a clip at the joint and saw it open. Give each spoke a strike which drives home the joint and saw in again. Now I put the wheel in the machine, set the gauge and have all at my command as soon as I have the throttle in my hand. When the hub comes up, the wheel is dished. I make it go back and forth several times until the job is finished. I then take it out, inspect it and get the customer's approval. If he wants it well dished we put it in again and again until he approves of the job; as many men have formed some idea about dishing a wheel. I always honor a customer by asking and explaining. Now all those who have to do it the old way can readily see how quickly it can be done, and how quickly from \$6 to \$8 or \$10 can be earned. I charge \$1.00 per set.

No; you cannot make all jobs good with this machine, even if the operator knows his business. It is not the machine's fault nor that of the operator. The customers are at fault nine out of ten times. They wear their wheels almost half out before they bring them in, and then you or the machine is expected to do a good job. A poor job is only made on a poor wheel, or if a poor job is made on a good wheel it is surely the operator's fault, as the machine is never to blame. And yet I do get many dished-in wheels that were tried out by local smiths in the old way with no success whatever; whereas, I am able, with the machine, to dish them out any desired degree.

Two years ago we had a very dry spell. I reset over one thousand old tires in about six weeks, which netted us a neat profit. Since we have this wonderful machine in operation our business has increased immensely. People come great distances to buy new wagons, and at the same time they bring old wheels along to have the tires reset, which does good advertising.

AROUND OUR FORGE FIRE

The Editor was busy looking over a large pile of shop photographs when Benton came in.

"Hello, Benton" greeted the Editor as the man-with-the-recipe-book entered. "What's on your mind?"

"Well, not very much" returned the other, seating himself in the armchair. "I've just been down to see Charley Bayes."

"How is Bayes getting along?" asked the Editor.

"He's getting on fairly well, but seems to have trouble with his collections. He says he does a good business and his entire force is always busy, but somehow or other he can't get hold of the money."

"He doesn't look after collections properly," returned the Editor. "A man can't carry on a business very long if he doesn't get in some money. A man may do an immense business but if he don't get the money what good does the business do him?

AN EXCELLENT EXAMPLE OF THE CHUNK—THE PREFERRED ANIMAL FOR FARM USE

When it comes right down to brass tacks we're all in it for the money. Every man does business for the money he gets out of it. And if he doesn't get the money—well, he'd better get out of business."

"Perhaps you have some ideas on the subject" suggested Benton.

"There are certain things that a business man, and especially the smith, can do— certain ways of caring for accounts that tend to keep the charge account from being a fixture on your books.

"There are just five things" continued the Editor, holding up the fingers of his left hand "that a smith must do if he wants to keep collections down to the lowest notch. The first: Know your customer. If you don't know him find out about him. If he is not a stranger in the vicinity the butcher or grocer will probably know him. And if he don't pay the grocer or the butcher you may depend upon it he won't pay the blacksmith. So when a customer asks for credit find out how he pays other business men in the town or vicinity. If he doesn't pay others he won't pay you and it is unnecessary to say—don't give him credit.

"Second: Get a definite promise as to when payment will be made before the goods leave your hands. This refers, of course, to those customers who do not have a month account. It would appear simple enough to ask a customer when he expected to pay for a certain job, but it is so simple that most smiths forget about it. And when the customer tells you at what time you may expect payment, make a note of the date. Put, it down in your books, and when that account is due see that you get paid or a good reason for not getting it.

"Now the third requirement is that you go over your books at regular intervals. You cannot keep in touch with your outstanding accounts unless you go over your books at stated and regular times.

"The fourth rule is closely related to the third and is simply the sending out of statements the first of every month or on the first and fifteenth. But no matter what day of the month you choose see that nothing interferes with your sending these things out regularly. And don't simply send out bills and statements monthly or semi-monthly, but follow these up with reminders until your customer comes to time.

"The fifth is a matter that will take care of itself if the first four rules are correctly adhered to. This is to be fair and square in your pushing of collections. Don't be easy nor too severe, but be fair both to the customer and to yourself. Follow up all promises promptly. If a customer wants credit and there is nothing in his dealings with other merchants to warrant your extending credit to him, handle that man tactfully. Circumstances will determine how to treat him. Be fair to yourself by getting cash from him or allow him to go elsewhere. It is always better to have the stock in your shop than in a man's buggy or on his horse and unpaid for.

"Be fair—let your customers know that a promise to pay means that you expect payment at that time. Remind them of their promises when due—tell them that it is better not to promise payment than to not live up to the promise.

"Be fair—don't be easy. The professional deadbeat soon finds the easy merchant, and the beat, slow payer and other undesirable customers fly to the easy merchant as moths to a flame. That is my message to your Friend Bayes and to every other smith with collection troubles." And the Editor turned about in his chair to indicate that the discussion was closed.

The Blacksmith

WILLIAM WATSON

'Tis the Tamer of Iron,
Who smites from the prime,
And the song of whose smiting
Hath thundered through time.

Like a Mighty Enchanter
Mid demons he stands—
Mid Terrors infernal,
The slaves of his hands.

As a pine-bough in winter,
All fringed with wild hair,
His arm, too, is shaggy,
His arm, too, is bare.

And the bars on his anvil,
They struggle and groan
Like a sin being fought with,
That's bred in the bone.

But against them he knits his
Invincible thews,
The Wrestler, the Hero,
The Man That Subdues.

As a crag looking down on
The floods in their ire,
He looms through the spray of
His fountains of fire.

Is he human and mortal,
With frailties like mine.
Or a demigod rather,
Of lineage divine?

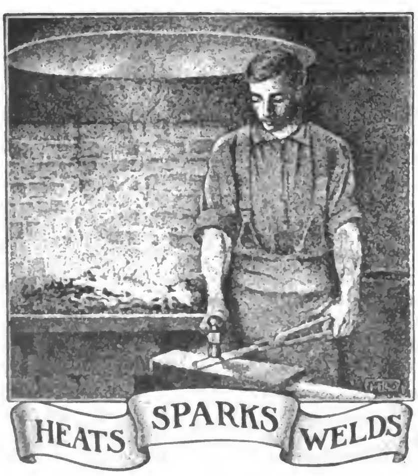
For the dread things of Nature
Crouch low in his gaze;
The Fire doth his bidding;
The Iron obeys.

He is Voland, great Voland,
Whose furnaces roared
As he fashioned for Siegfried
The wonderful Sword.

"Whatsoever is mighty,"
He sang in his glee,
"'Twixt hammer and anvil
Is fashioned by me."

And he made the bright blade from
His rapture and joy,
Being one with the Gods who
Create and destroy:

The Gods at whose signal
The fuel was hurled
On the fires of the forges
Whence issued the World.



Are you letting a gas engine do your work?

Brains or luck—which do you think accomplishes more?

Eight o'clock customers can't be caught by a ten o'clock riser.

It's a most important factor in good smith work. Is your coal all it should be?

Pleasures are greater in anticipation than realization. And how true also of troubles.

Don't wait for a fire to remind you of your lapsed policy. Attend to it today—now, before the fire occurs.

How do you treat your tools? When they don't work right think of the treatment you have been giving them.

It is impossible for the vehicle painter to be too clean or too careful. Painstaking care pays on even the smallest job.

When you have a number of duplicate forgings to make, get up formers for the job. Make the head save the hand.

When a customer kicks do you investigate? All men are not chronic kickers. Sometimes a smith may be at fault.

Now is a good time to pick over the scrap pile. Save the things of value, but do throw out the rubbish. Throw it out.

If you don't think advertising pays, don't hang out a sign, don't talk about your business, don't use printed stationery.

Keep in touch with things generally. Be posted on the affairs of the world and country as well as those of county and town.

What part of "Our Journal" do you like best? We can work together to mutual advantage—suggestions are always welcome.

> **Uncle Billy Martin Says:** "Ef thay want t' howl—let 'em howl. Do what ye think is rite and do it quick."

Investigate. There must be a reason. Again we say, if there is something wrong with your business—investigate. There must be a remedy.

Don't let up on your advertising. It's effect is accumulative and the longer and stronger you advertise, the bigger and more profitable the returns.

The time to do is right now—not tomorrow, next week or next year. Ever hear of Satan having anything to do with the man who was beforehand?

Don't forget—We'l have lots of Pink Buffaloes. If you are out of them or your supply is low ask for a new lot. They are free—we want you to have them.

That is pretty poor stuff which has no good points about it. "Which has the most good points?" is the question that the buyer and employer must decide.

Lest you forget—you can save money by taking advantage of our long-time rates. Save from 40 cents to two dollars on your renewal. Ask the subscription man.

Don't complain about not getting your paper if you haven't notified us of your change of address. Advise us the minute you move and then we'll be responsible.

Are you building your business for today only? If so, don't pay any attention to satisfying your customer—get as much out of him as you can at the least expenditure of time and money.

The best is none too good. Cheap machines are expensive and more bother than they are worth. Consult our advertisers about good goods. The best always proves cheapest in the end.

Are you gathering in some of the automobile money? There's no reason why you should not and there's every reason why you should. Read our auto department—it will tell you how.

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An unorganized body of smiths is like a ship without a rudder—it is entirely at the mercy of the elements upon which they depend for support. At times they ride on the stream of profit, but the winds of unwise competition take them far out of their course into the sea of low prices. They are continually encountering rocks of incompetent workmen, reefs of complaining customers and a continual mutiny of price cutting and contention. There are plenty of men in the crew willing and competent to take the helm, but no one to build the rudder of organization. Put an end to this hopeless voyage of bickering and strife—appoint yourself boss carpenter and build the rudder to guide your craft ship into the harbor of harmony and better prices. A ship with a rudder is easy to sail.

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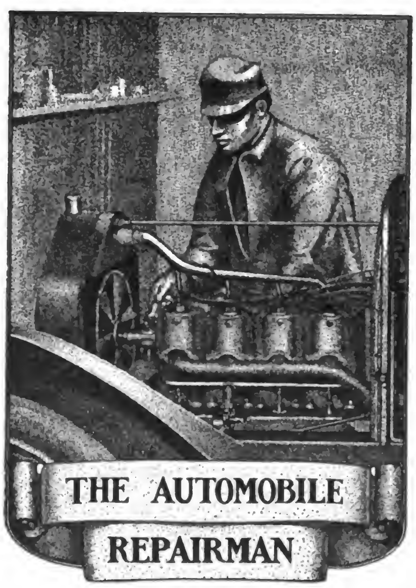


Adjusting, Repairing and Caring for the Automobile—4

With Special Reference to the Packard Car

Taking Care of the Motor

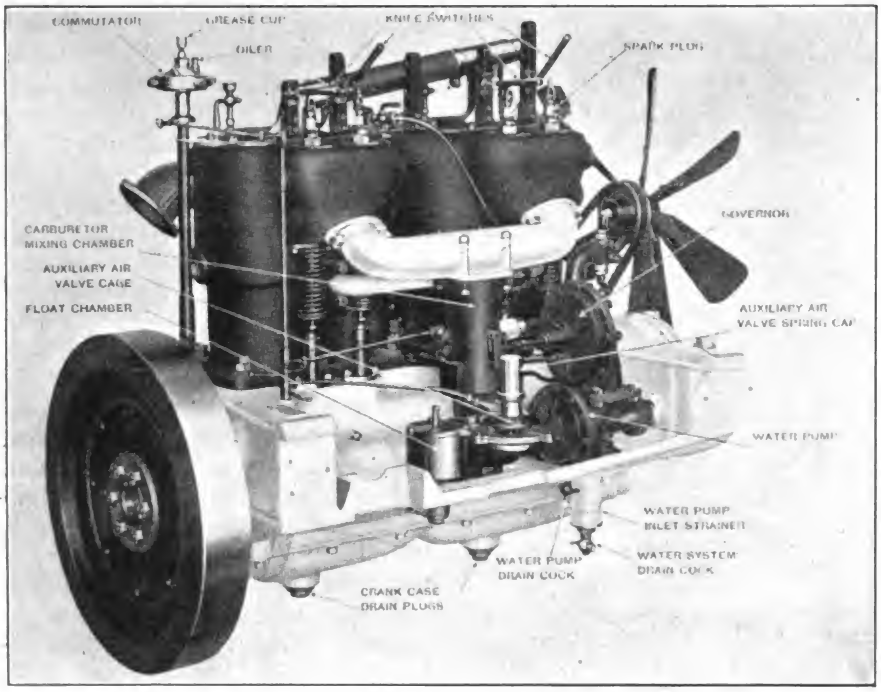
Do not, under any circumstances, run a new motor at sustained high speed. Do not unnecessarily race the motor. This is extremely injurious and is never of any purpose. Compression in all cylinders should be equal and up to the standard. Test the compression occasionally by turning the starting crank until resistance is felt in each of the four cylinders in succession, comparing the result. If the compression of one cylinder is less than the others, or all are weak, the valves may not be seating properly on account of insufficient clearance between their stems and the lift rods, or because there is a small deposit of carbon on one side of the valve face. Either of these faults may be quickly remedied. If they do not exist the valves need grinding.

If any or all of the valves leak, they should be ground to fit their seats, using a mixture of oil and powdered glass or some prepared valve grinding paste. To grind a valve, unscrew the valve chamber plug, remove the valve collar key, valve collar and spring. Take out the valve and clean it thoroughly, also noting whether or not the stem is clean and otherwise in good condition. Stuff rags or waste in the port between the valve chamber and the cylinder to keep grinding material out of the latter. Then replace the valve upon its seat, and grind by rotating it with a screwdriver, the grinding paste being between the valve and the seat. The valve should be ground until it has an even bearing entirely around its face.

Carefully remove all grinding compound before finally replacing the valve and starting the motor.

The inlet valve roller holder, or lift rod, should be so adjusted that there is a clearance of .004-inch, between the lift rod and the valve stem, when the valve is closed. The exhaust valve roller holder should be so adjusted that there is a clearance of .006-inch. Be sure the motor is warm when adjusting the clearance between the valve stems and lift rods. Setting the valve cam shafts is only necessary when the front gear compartment gears have been removed and replaced; Open the priming cocks on the tops of all four cylinders to relieve compression and allow the engine to be "turned over" easily. It is also convenient to remove the front fenders for such work as this. On the cam shaft gear hubs are marks and the gear should be set on the shafts so that these marks will line up with corresponding marks on the shaft flanges. Then put all the gears in place so that the marked tooth of each gear is in mesh with the correspondingly marked tooth of the meshing gear. Finally, establish the correct clearance between the valve stems and roller holders or lift rods of .004-inch for inlet valves and of .006-inch for exhaust valves.

If the motor always knocks when the spark is not retarded and does not seem to develop the normal amount of power, it is possible that the cylinders have become carbonized. If this is the case, remove the cylinders and scrape the carbon from the piston heads and from the walls of the combustion chambers of the cylinders. It is desirable to grind the valves after this operation.



INLET SIDE OF THE PACKARD MOTOR

The crank case of the motor is divided horizontally into three sections. The uppermost, or main section, comprises the motor base and contains the cam shafts. The front end gears for operating the cam shafts, water pump and magneto are in a separate, but integrally cast, extension of this section of the crank case. The middle section of the crank case is a frame which is attached to the upper section by suitable studs and nuts. The main crank shaft bearings are held between these two sections. This construction allows the lower sections and main crank shaft bearings to be removed without affecting in any way the support of the motor. The two upper sections really compose the crank case; the undermost section being simply an oil well to enclose the bottom of the crank case. It is readily removable, and its removal exposes all of the parts within the crank case for inspection, cleaning or adjusting. No other parts are disturbed by removing this oil well. The middle crank shaft bearing is supported by a central transverse partition which divides the crank case into front and rear compartments. This is the reason for the double oil pump and separate supply of oil to the front and rear compartments of the crank case, as previously described.

An independent level of oil being maintained in each section, the level is approximately correct for all cylinders, even when the car is running on a steep grade.

There is never any occasion for continued cranking of the motor. If the motor does not start readily, look for the reason and correct the trouble instead of attempting to make the motor run by continued cranking. Except when warm, a new motor "turns over" stiffly. This is because all bearings and working surfaces are snugly fitted to insure long life. To facilitate cranking, there is in the Packard "Thirty" a relief handle which partially relieves the compression in the cylinders. This is a "T" shaped handle below the radiator, on the left side. When this handle is pulled forward, the exhaust cam shaft is shifted and brings into play a set of supplementary cams that prevent the exhaust valves from entirely closing and thus relieves the compression in the cylinders. Push the relief handle back as soon as the motor starts. On account of the fact that the Packard "Eighteen" has smaller cylinders and, consequently, is easier to crank, a compression relief is unnecessary and is not provided. Always crank the motor with the left hand, as this is less liable to result in personal injury in case the motor should kick back.

How I Repainted a Motor Car

H. W. Ladd

In "Motor"

The following paragraphs are not the *ex cathedra* utterance of an expert automobile painter. They simply describe how an amateur owner, who confessed to total ignorance of the art when he tackled the job, painted his automobile with respectable success and at very little cost.

To begin with, the system followed was not the regular carriage system of numerous coats of flat color, each rubbed down with pumice and followed at length with two coats of varnish. It was a special system devised by a middle western concern for amateurs; and it comprised one coat of flat color, not necessarily matching the final color, and drying in twenty-four hours; a second coat of glossy color, also drying in twenty-four hours; and a coat of clear finishing varnish, taking a week or more to harden. All the coats were extra heavy, so that a considerable quantity of material was laid on. The second coat was semi-transparent, and the first coat, which did not match it by several shades, was intended partly to cover slight blemishes, and partly to afford a uniform color foundation for the second coat. In my own case the previous colors of the car had been dark blue with yellow running gear, whereas the new color for both body and running gear was crimson, with venetian red for the first coat. Owing to the fact that no color coat matched the previous coat, it was necessary in general to avoid rubbing or sand-papering, in order to avoid showing the wrong color in case the last coat rubbed through. This point will be referred to later.

As the novice cannot do striping, it was proposed as a substitute for striping to outline the mud-guards, bonnet and dash, in black, also to put black spots on the heads of the bolts in the wheel hubs, and to blacken the steering wheel and the irons for the folding top, side lamps, etc. The precise amount of black outlining would naturally depend on the taste and fancy of the owner. The writer's car was small, and it was, therefore, decided not to outline the doors and body panels, as that would have the effect of making the car look

still smaller. For the same reason a uniform tint was used throughout the body and running gear instead of the contrasting tints formerly used. The steering column and the side levers were also painted red, instead of being black or brass plated as before. As the car had not been painted for several seasons, and was externally in poor shape, a can of putty was added for smoothing up cracks and dents.

With the paint came suitable brushes, a two-inch fine flat camel's hair brush for the paint, a similar brush for the varnish, and a long quill pencil for blacking. It would have aided matters had a one-inch flat brush been added for working around bolt-heads and in other narrow spots. This the writer supplied at his own expense.

After washing, the car was stripped of lamps, horn, generator, and all other attachments. It happened that the car was being overhauled at the time, and the body had already been drawn back and blocked up on the chassis. Advantage was taken of this fact to do a more thorough job of painting, since otherwise no doubt some cracks and crevices would have shown the old color. In addition, the axles were propped up, and the rear wheels were removed. The next step was to take gasoline and a brush, followed by clean waste, and to remove the last traces of grease around the bonnet, wheels, steering column, etc., since the paint would not have adhered to greasy surfaces. To one who has not looked for them, the number of places where grease can be found will be a surprise.

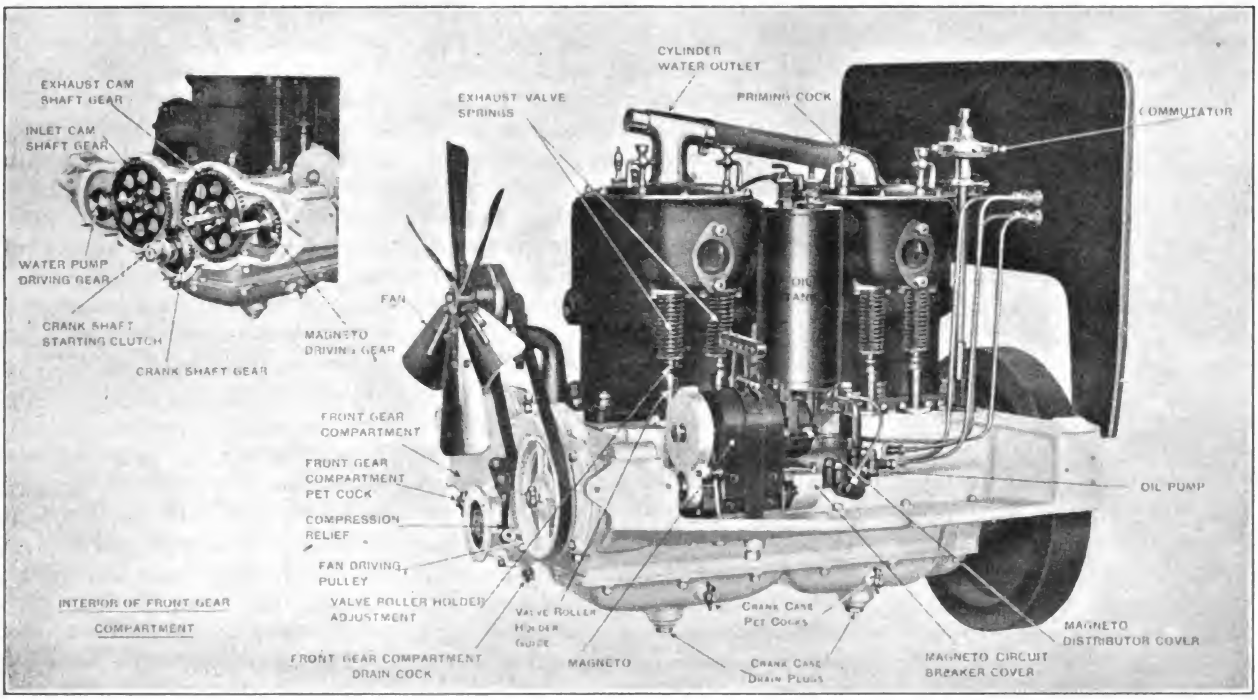
After cleaning, the varnish of the body was rubbed with a rag dipped in wet powdered pumice to remove such of the gloss as had survived the washings of three or four seasons. After rubbing, the pumice was carefully cleaned off, using a tooth brush where necessary to expel it from the cracks. Fine sand-paper was used on the running gear where needed, to smooth rough spots or remove gloss.

The next step was to go over the dents, cracks and chipped spots with a little lead paint (the color did not matter) to hold the putty. After drying a day, the putty was applied with a putty knife and carefully rubbed down smooth so that the finished job would be perfectly flat. The putty was allowed to harden for several days, and was then very lightly sand-papered with medium sand paper before applying the first coat.

One spot in the frame and body had been scorched, due to the apron underneath catching fire from an overheated exhaust pipe. The blistered portions were sand-papered down approximately smooth, and were then lightly puttied over. The putty, when dry, was carefully sand-papered and given an extra coat of flat color before the regular first coat was applied.

The makers had supplied fairly complete condensed instructions. Necessarily these omitted a number of points which are best learned by experience. One point at the outset I felt safe in disregarding. The instructions were to begin with the body, dash and bonnet, and work down, in order to catch any paint which might locally run, and to go over drops falling from the brush before they had time to dry. Having a well-grounded distrust of my own ability as a painter I took advantage of the fact that the body was raised clear of the chassis to leave it for the last in applying each coat, in order to take advantage of my previous practice. Accordingly I began with the axles and springs, as the least likely to show poor work, and followed them with the steering gear, frame and wheels. After the wheels I did the dash, then the bonnet (in position), and finally the body. This plan worked well, owing to the fact that the body was separated from the chassis. It required a little vigilance in looking out for drops of paint which would have made trouble if I had allowed them to fall on surfaces whose paint had just begun to harden. As a matter of fact I had no trouble in this regard.

Although I began by painting the bonnet in position, I realized later that I should have done better to spread it flat on the floor, which I could easily have done in the attic of the house. This would have lessened the tendency of the material to run, and would thereby have enabled me to lay on thicker

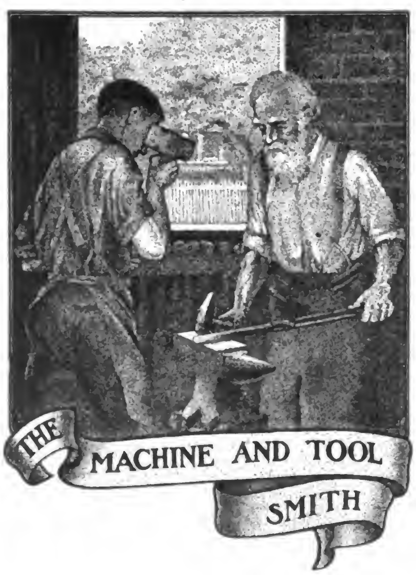


THE EXHAUST SIDE OF THE PACKARD MOTOR; ALSO SHOWS THE ARRANGEMENT OF THE FRONT GEARS

coats and attain smoother surfaces, owing to the tendency of the paint to flow smooth and obliterate the brush marks a few minutes after it is applied. This does not refer so much to the first coat as to the succeeding coats, since the first coat dries about as the brush leaves it.

Being a rank amateur I nearly ruined the job with the first coat, by a senseless interpretation of the instructions. The latter, after telling me to begin at the top and work down, stated that "the most common fault of the novice lay in not applying enough material." I interpreted this to mean that the brush should be filled as full of paint as it would hold without dripping, and that it should be worked vertically downward, virtually flowing the paint on like lacquer. I found after a little trial that I could work the brush in this manner, and it certainly laid on lots of paint, so much indeed that my supply, which would have left a considerable surplus after finishing the first coat, was entirely exhausted before the mud-guards were reached. Later, on attempting to apply the second coat, I realized the egregiousness of my error. That double-thick first coat was as full of brush marks as a beach is of sand.

(To be continued.)



The Treatment of Gears

J. F. Sallows

A great many firms have trouble with gears as well as with other parts in the hardening department. In a large plant, where there is a laboratory and an up-to-date chemist, most of these troubles can be overcome to a certain extent; that is if the hardener will take an active interest in his part of the game. In the first place if the gears to be hardened are not of the proper carbon content and are not annealed before the machining is finished there is bound to be trouble in plenty, and bear in mind the blame always falls on the hardener. So it behooves that gentleman to find out all he can about the proper grade of steel he should have; and if he cannot get the proper grade then he can throw the blame on someone else. The intention of the writer is not to blame and find fault, but to help and enlighten the fellow who is up against the real thing in the hardening line.

Now if there is no laboratory and no chemist at hand, then the hardener is up against a proposition that will take years of practical experimenting and a great waste of money to overcome. For instance, Vanadium Steels are the best steels for use in all lines of automobile construction. But very few firms, so far, are using this grade, more on account of the price than anything else. Some use common fifteen-point carbon open-hearth steel. This makes a very good gear for transmissions and differental gears, and also for drive pinions and large bevel drive gears. But they require careful handling in the hardening department. A great many use nickel steel in gears, and it is the thing to use if properly treated.

The writer has seen nickel gears that were reheated in a lead bath and quenched in oil, but on arrival at the inspector's office were found to be altogether too soft. Most firms want the teeth of gears to be glass hard, and this is quite a job to obtain by using a lead bath. Later we will tell you how to obtain this glass hardness on gears as well as on other parts.

The hardener has a great deal of trouble with gears warping in the process of hardening. This is as much the fault of the gear construction as anything else. For instance, look at Fig. 1. This is a sectional view of a transmission gear, and it is wrong in this way: the web A is altogether too far to one side. It should be in the center of the gear proper. But for some reason a few engineers design just such a gear as the one shown here. It is quite a job to keep a gear of this kind from warping while going through the hardening operation. Further on we will show how it can be done. Now, if the transmission gears were all made as the one shown in Fig. 2, there would be no trouble in keeping them where they belong. The web A in this gear is centrally located and is heavy. A great many firms build their gears along this line, and experience very little trouble in keeping them to shape.

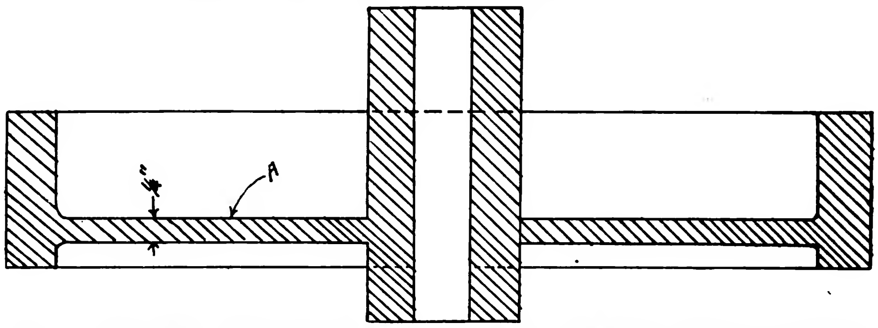


FIG. 1.—SECTIONAL VIEW OF TRANSMISSION GEAR. INCORRECT DESIGN TO PREVENT WARPING IN HARDENING

Then we have the large bevel gear to contend with. A sectional view of one is shown in Fig. 3. It is almost impossible to prevent this style of gear from warping out of shape if it is not handled correctly. These gears are riveted to a casting after hardening and are ground true on face A before riveting. They must be very near perfect in order to be used at all. The writer has known of firms who have broken two thirds of their large gears trying to straighten them after hardening. But if these people would take time to read a

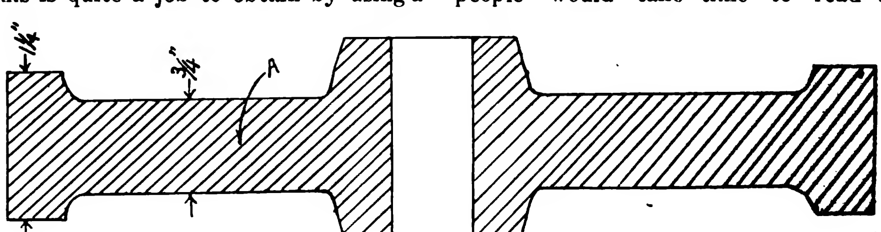


FIG. 2.—SECTIONAL VIEW OF TRANSMISSION GEAR CORRECTLY DESIGNED TO PREVENT WARPING IN HARDENING

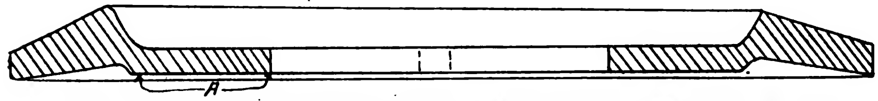


FIG. 3.—SECTIONAL VIEW OF LARGE BEVEL GEAR USED IN REAR AXLE OF SHAFT DRIVE CAR

mechanical journal they might learn something to their advantage that would be to the disadvantage of the junk dealer at the same time. It is noticeable that the parties who are having the most trouble with their work seldom read anything but the want columns of any journal. Always on the lookout for another job as it were, anything to make a change and spoil work for someone else. The writer has received a great number of letters from readers of THE AMERICAN BLACKSMITH complimenting him on the articles published in its columns lately, along the lines of hardening auto parts. This goes to show some are reading and profiting thereby.

To take up the subject of how to keep our bevel gears straight while hardening, Fig. 4 shows a form for this kind of job, assembled and in parts, for the benefit of the reader who wishes to make one for use in this line of work. At A is shown the foundation and stem, all in one. This can be made from a casting and mnchined up true. Notice key-hole B, for flat key. Then there is large washer C, and a flat key D. In the engraving showing device with gear in place the bevel gear is marked E. Before going further I want to call your attention to Fig. 5.. This is a face and edge view of the washer seen at C, Fig. 4. Drill a couple of holes at 45 degrees, as shown in Fig. 5, and bend a piece of ½-inch round steel U-shape, the required width to fit holes as shown at A. This answers nicely as a handle to place and remove washer from form, instead of handling with bare hands or tongs. Now, in order to keep flange part of bevel gear soft, cover with fire-clay as shown in Fig. 4 at F.

Pack in Number 1 Blaich Modern Carbonizer. This is a fine grade and gets well down in between the teeth of gear, and being composed chiefly of leather imparts a finer grain to the case and renders the gear less brittle. If, however, you are a raw bone adherent, be sure you get raw bone instead of oyster shells and buffalo horns, as this is about what we get nowadays when we order raw bone. Leather, properly charred and used as a carbonizer, has no equal today. After packing a number of gears in box and sealing cover on, place in furnace and carbonize for 7 hours at 1650 F. Then set out to cool. When cool, clean off all fire-clay and put in boxes again for reheating. Heat to about 1450 F. or 1500 F. and have a wire basket suspended from a tackle, just out of your oil tank. In the January issue of the Journal, on page 96, Fig, 7, you will notice a basket of the kind mentioned, full of small gears.

When your bevel gears are ready to remove from reheating furnace, place form described in Fig. 4 on bottom of basket, place hot gear on form, then put on washer C and drive in key D and lower all into oil tank, and the trick is done. Some reheat gears of this kind twice, but this is a very expensive operation and just as good results can be obtained by reheating at a lower heat. For instance, if the gear is found to be brittle when dipped at 1500 F. try 1400 F., or perhaps 1350 F. will do. You can get the required results by regulating your reheat instead of reheating twice, and at the same time save your employer a heap of money. The writer has hardened thousands of gears and never lost one yet from brittleness or on account of being soft. Neither has he drawn one, as so many talk about, and has reheated only once. Of course, if your reheat is too low your gear will not be hard enough, and if your reheat is too high your gear will be brittle. You must find out the required temperature for your reheat to suit the grade of steel you are using, and success will crown your efforts.

A Talk on Welding Steel

E. G. FLICK

This is a subject in which every blacksmith has had more or less experience.

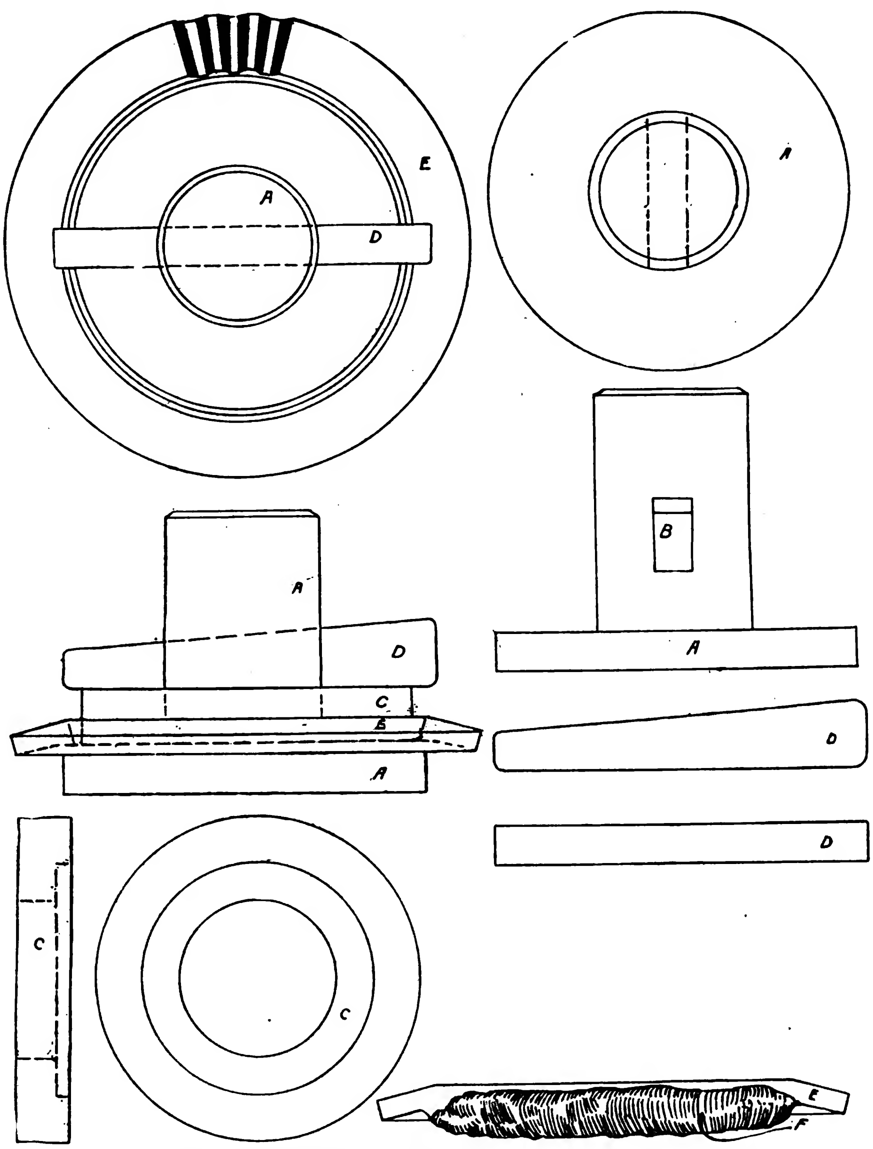


FIG. 4.—HOW TO KEEP BEVEL GEARS FROM WARPING WHILE HARDENING

We all know that some grades of steel can be welded and others cannot. The more carbon steel contains, the more difficult it is to weld. Steel which contains over one hundred and forty points of carbon will not weld in a satisfactory manner. To successfully weld steel it is necessary to have a good clean fire as free from sulphur as possible. For welding on the anvil a short lap gives the best results. If you are troubled with the steel slipping back take a blunt chisel and cut a notch in both pieces close to the back end of the scarf. When you take the pieces out to weld, place the two chisel cuts together. This will prevent slipping. If you wish to make a V or split weld, notch the pieces that go inside and hammer the laps down over it. For welding flat, thin pieces of steel some smiths split both pieces. If you wish to do this split both pieces before you scarf them. Then when you scarf the ends let the inside corners of the scarfs spread as much as they will, and when you put them together the inside corners of the scarfed ends will reach onto the solid steel and will insure a good weld, leaving the center strong and solid. The above is the best way of welding flat springs. After the weld is made, forge the steel to the desired shape but leave it a little thicker than the finished size, finishing it to the proper thickness with a flatter and sledge. Give it several good blows on both flat sides while the steel is a dark red, but do not hammer on the edges after you have commenced to pack the steel.

To weld tool or spring steel it is necessary to use a flux to keep the steel from burning. Borax is generally used for this purpose. Borax always contains sulphur, and sulphur is injurious to steel. If you have nothing but borax you can greatly improve it by melting it and heating it until it is dry. It will then be what is called charred borax, and will be found to give far better results than borax in its natural state. We often hear smiths say there is nothing as good as borax for welding steel, but most smiths know better, though borax is better than nothing for welding. There are several good patented welding compounds on the market, but for welding tool or spring steel the following welding compound is the best I have ever used. Try it, you will be pleased with the results.

Charred borax	2 oz.
Soft steel or wrought iron filings	2 "
Rosin	2 "
Sal-ammoniac	4 "
Carbonate of iron	4 "

Mix thoroughly and use the same as borax. This compound is excellent for restoring burned steel. To test it take an old file, heat the end till it flies to pieces. Then dip the end in the compound and let it remain four or five seconds. Then with quick light blows weld up the end, draw it out and make a cold chisel of it. You will be surprised at the results. Overheated steel will never be as good as it was before being overheated, but accidents will happen to the best of us sometimes and it is well to know how to make the best of them. We often see a smith take a dozen heats on a weld and then not get a solid job. Some are afraid to heat the steel hot enough; others heat it too much; some will

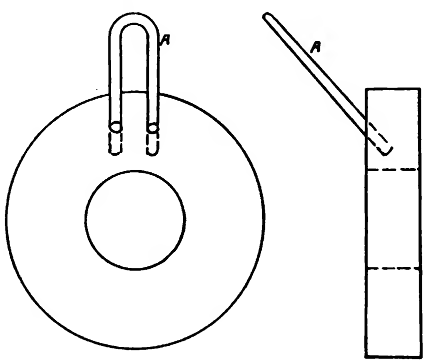


FIG. 5 —HOW THE WASHER IS HANDLED

plaster both sides all over with borax and then try to stick them together with both sides swimming with melted borax. The chances are it will slip and he will take another heat. After a while he may succeed in sticking them together, but it will not be a solid weld. If you use borax give the pieces a couple of good blows over the anvil to knock all the borax off the scarfs before putting them together to weld. Some welding compounds give the best results if left on the scarfs; others should be knocked off the same as borax. When welding steel be careful to get a good clean heat and do not use too much borax or welding compound. Don't be afraid to use a little elbow grease. A few good quick, hard blows are worth a hundred light ones. If you cannot strike a blow that will do some good, do not strike at all—better to just stand and look at it. If tool steel is to be welded to iron or soft steel always get a good high heat on the iron or soft steel, and as high a heat on the tool steel as it will stand without injury. Commence welding on one side and work to the other, or commence in the middle and work both ways. Never strike one side and then the other, for if you do the dross cannot get out, and this will prevent solid welding. In some cases a poor weld may cost someone his life. Let your motto be: "A solid weld or none at all."

How to Forge a Four-Tine Fork in One Piece

Bert Hillyer

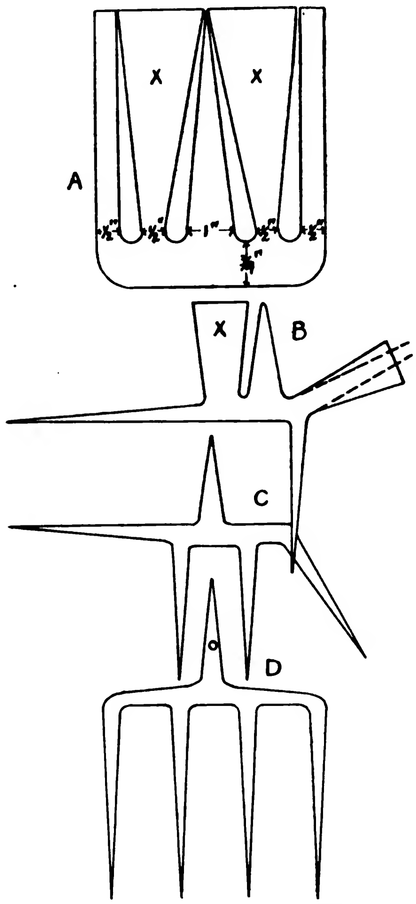
Some will no doubt think this rather a difficult piece of work, but it really is simple when you know how. First, take a piece of steel, 5 by 6 inches by $\frac{3}{8}$ inch thick, and punch four $\frac{1}{2}$-inch holes $\frac{3}{4}$ of an inch from one edge and at distances as shown at A. Then cut out the stock from the holes to the farther edge, as shown, using a hot chisel so as to make clean edges. The corners at the bottom are cut round. Now take one end-piece and bend it down on a line with the bottom edge of the stock. This allows you to draw it out well. After the end prong is drawn out, bend it still more until it points just opposite to the others and at right angles to the bottom edge of the stock. In bending the end prong in this way the next division of stock will have been thrown out at an angle, as at B. Then draw out this second prong the same as the first one and bend it, as at C. In this way the two center prongs of the finished fork are really the two end divisions of the stock, as shown at A. It will also be understood that the divisions of stock at XX will need to be drawn out as much longer than the first prongs as the distance between the tines of the fork. The finished fork is shown at D. The engravings make further explanation unnecessary.

How to Forge Collar Bolts and Rods

Bert Hillyer

A collar bolt is a small, simple forging to make, but requires more attention than is at first supposed in order to make it round and true. Some smiths make a beveled washer or collar and weld it onto the rod. This method answers fairly well if they have a top and bottom swedge bearing the impression of the collar to help in welding and shaping. If the smith does not have these tools he generally takes a piece of square iron, makes a collar and welds it around the rod. He then takes a sharp, hot cutter and cuts a bevel all the way 'round the collar, trues it up and smooths it with the set hammer.

The best way to make these bolts, if there is any quantity of them to be made, is to make a tool like the one in the engraving. The piece A is of steel. The outside diameter of it is the same as outside diameter of collar. It has a hole lengthwise through the center of it $\frac{1}{16}$-inch larger than the thread end of the bolt. Part B is a block of round, soft steel bored out so that piece A fits nicely into it and goes down about $\frac{3}{4}$ the length of B. The hole then tapers to the size



A FOUR-TINE FORK MAY BE FORGED IN ONE PIECE

of the stem as the dotted lines show. This piece is placed over the large hole of the anvil and the stock upset as shown in the engraving. Bring to a good heat and drop long end down through B. Slip A over bolt stem and down in tool B. The helper at this point strikes good lively blows, and when stock is taken out of the tool we find a first class collar bolt, nice and true and without a weld. One advantage this tool possesses over others is that the stem is bound to come in center of collar and, as the metal cannot escape, it forms itself into a true collar.

This tool can also be used for making small eye bolts which have a collar on them. Drive a chisel through the stem lengthwise and then swell it out into an eye. The only fault to be found with this tool is that the length of the bolt part is limited to the length of the hole in piece A. But as the general run of this work is not over five or six inches in length it will cover a large part of it.

While writing on the subject of bolts I may as well speak of the large T-headed bolt. The smith who has a power hammer will draw his down from a piece as wide and as long as the head, while the smith without power hammer makes his by welding. I have found the best way to do this welding is to take a piece of square iron, its thickness depending upon the size we intend making the head, and bend it in a V-shape. Cut off the length it is to be when finished and, while hot, put a round piece of iron the diameter of the bolt in center of the V-piece and drive down with the sledge. The end of the bolt is then upset and put in the hole of the V-piece and welded up.

Four Practical Hints for the Practical Man

J. N. Bagley.

To Dress and Temper a Mill Pick

To dress a mill pick heat it to a degree that will allow it to be worked as any ordinary tool steel. After the shape is as desired heat the points to a cherry red and dip them into hot tallow. Hammer very lightly and they are ready to temper. Take 3 ounces muriate of ammonia, $2\frac{1}{2}$ ounces chloride of potash and 3 gallons of soft water. Heat the points to a cherry red and plunge into this solution. If the points are too hard add a little more water and heat again.

To Temper a Round Piece of Cast Steel Without Springing

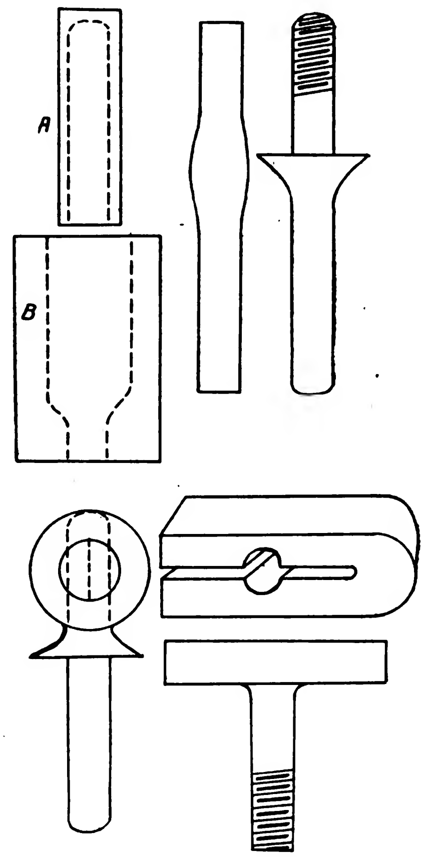
Any one who has tried to temper a long piece of cast steel will know what a job it is to do the work and not have the work come out of the bath crooked. It is a very easy job if done in the following way: Take a bucket or tub that is about 6 inches deeper than the rod to be tempered is long and fill it nearly full of water. Start the water whirling with a stick and plunge the hot steel perpendicularly into the center of the whirl. The water whirling about it will keep it perfectly straight.

To Weld Steel Boiler Tubes

Occasionally the smith is called upon to weld a steel boiler flue, and if he has no experience along this line the following will be found valuable. Take the longest piece and flare it a little, leaving it funnel shaped for about one half inch from the end. Into this fit the short piece of flue and place in the fire. When hot enough sprinkle on the welding compound as in welding any ordinary steel. Have a helper with a light hammer tap gently on the end of the short piece, while you, with another hammer, tap the joint; at the same time keep turning it in the fire. Do the entire job while the work is in the fire.

To Write Your Name on Iron Tools

Very often it is necessary to mark your tools with your name. The following way will be found to be an excellent method and cost but very little compared to using the steel letters, and besides some tools are hardened until the steel letter cannot mark them. In the first place the place to be marked must be covered with melted beeswax, and after the wax has cooled take an awl or some similar instrument and scratch the name as you wish it to appear. Now pour a little nitric acid into the name you have scratched in the wax and let stand for a few minutes. Then wipe the wax from the tool and thoroughly clean and the name will be written on the metal just as it was scratched in the wax. Care should be taken to allow none of the acid to get



HOW TO FORGE COLLAR BOLTS AND RODS QUICKLY

onto the hands or the clothes. This acid is very strong and quick in action and care should be exercised in handling it.

Gun and Novelty Repairing—18

W. G. Mumma

A cement for fastening emery to wood; take 1 part of shellac; 1 part of white rosin; 1 part Carbolic Acid in crystals. After the two first ingredients are mixed and melted, add the acid.

A cement to join metals to wood; 2½ lbs. of glue, dissolve in water; 2 ozs. of Gum Ammoniac; 2 ozs. of Sulphuric Acid added drop by drop.

Chilling cast iron; ½ pint of oil of vitriol or sulphuric acid; 2 ozs. of saltpeter and 3 gallons of clean water. Heat the cast iron to a red and then plunge into this solution, keeping it there until it is cold.

To weld spring steel; take a small piece Russian sheet iron and place on the joint just before it comes to the proper heat. This will melt and flow into the joint, making a perfect weld.

A filler for cast iron; Take 1½ ozs. of white lead, dry; 1 quart of finishing japan, stir enough rottenstone in the above until it is a thick paste.

To fireproof wood; take 3 parts of alum; 1 part of copperas. Dissolve in water and apply hot to the wood and repeat until the wood is well saturated, then follow with a solution of copperas mixed with fine clay to the consistency of paint; apply with a brush. Another one is to take 3 quarts of ground wood ashes and 1 quart boiled linseed oil; apply with a brush.

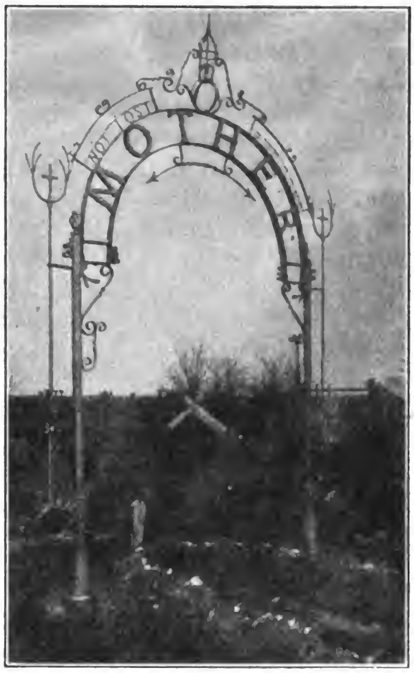
A hardening compound for small tools; make a paste by taking 2 ozs. of oxalic acid soap dissolved in warm water; then add enough lampblack to make a thick paste. Keep sealed in a tin can. Warm the article a little and smear the paste all over it. When dry, heat and quench in the common way. The paste is removed by the bath, which will leave the surface clean so that the color can be seen in tempering and it will protect it from overheating.

To prevent scale in hardening small work; use powdered ivory black and sperm oil mixed to a thick paste, and apply a thin coat. This will retain the brilliancy of the surface.

In babbiting; if the surface of the interior of the box is tinned the babbit will adhere to the surface and will amalmagate with the iron much better than if not tinned, acting the same as cement.

To make good solder for aluminum; take 64 parts of tin; 3 parts of zinc; 1 part of lead and a small amount of rosin. Melt and mix thoroughly and run out in bars of any desired size. To use, clean the surface completely and apply the solder; no flux is required, the rosin in the solder will cause adhesion. The parts should be heated slightly, then the solder will stick better.

To blue steel without heating; take ½ oz. hyposulphide of soda· ½ oz. acetate of lead and 1 quart of water. Dissolve in the water and then heat to the boiling point. The articles to be blued should be cleaned thoroughly and dipped into the hot solution until the color is to the required tint. To get a more brilliant color is to copper the articles with blue vitriol solution and then dip in the first solution; this will answer for brass and copper.



FROM THE FORGE OF MR. HANS HANSON OF KANSAS

A black bronze for brass; take nitric acid and dip the article in it; after it is clean and bright place it in the following mixture until it turns black: 12 lbs. of hydrochloric acid; 1 lb. of sulphate of iron; 1 lb. of pure white arsenic. Take out and rinse in clean water and dry in sawdust; polish with black lead and then lacquer with green lacquer.

Varnish for drawings; take 8 ozs. of sandarach and dissolve in 32 ozs. of alcohol. Another receipt is to dissolve 2 lbs. of mastic and 2 lbs. of lammar in 1 gal. of turpentine without heat. The drawings should first be sized with a strong solution of ising glass and hot water.

For acid-proof cement use a concentrated solution of pulverized glass to form a paste.

For soldering galvanized iron use raw muriatic acid; it will not be necessary to scrape the surface.

Bluing iron or steel; take and mix 1 part of clean sand and 1 part of powdered charcoal. Heat in a pan or receptable. The article should be polished and placed in the mixture; when the desired color is had take out and cool, then wipe dry with a cloth.

An enamel glaze for coating iron; take and mix 130 parts of flint glass; 20 parts of carbonate of soda and 12 parts of boracic acid. Apply with a brush and then dry at a temperature of 212 degrees; then heat to redness and cool very slowly.

To preserve tools, guns, etc., use an oil made by mixing high test grain alcohol and high grade sperm oil, equal parts. Keep in a tightly corked bottle and shake before using; this will protect the surface from rust.

Tinning wash for brass work; use 6 lbs. of white argill (potters' clay); 8 lbs. of tin shavings and 2 gals. of soft water. Boil the brass in this solution for about 20 minutes.

Non-rust soldering solution; dissolve rosin in acetone, making a solution. Apply the same as generally is done. This can be used where acids must not be used.

Preparation to drill hard iron; 2 gals. of petroleum; 1 gal. of turpentine and 20 ozs. of camphor. Use a drip pan for the tool.

To black articles that are not soldered; dip in a solution of nitrate of copper, then heat the piece over a torch or spirit lamp until it turns black from a greenish color.

A black varnish for metals; take 1,000 parts of benzine; 300 parts of pulverized asphalt; 6 parts of pure India rubber and add enough lampblack to the above to give the required consistency.

To mix plaster of paris properly; put the plaster into the water instead of the water into the plaster; when all is in stir up well; when the plaster shows above the surface of the water it is then about the right proportion.

To make a white solution for writing on blue prints; to water add washing soda, then add enough gum arabic to prevent spreading and ragged lines.

A lubricant for lathe centers; use 1 part of graphite; 4 parts of tallow; mix thoroughly.

To remove hard grease from iron, etc.,

½ lb. of caustic soda and 2 gals. of water; boil the parts to be cleaned. It is possible to use the mixture several times before it is exhausted.

To clarify shellac varnish; into the varnish precipitate some crystals of oxalic acid, stirring to aid the solution, then let stand over night to let the impurities settle; use no more acid than is necessary.

To true up oil stones; take a flat board and sprinkle clean sharp sand on it and rub the stone back and forth lengthwise. This will cut it down to a true level surface. Use plenty of water and sand at intervals. Emery powder that is coarse will do, but is no better than sand.

To true up a grindstone; if you have a good grindstone that has become out of round and needs to be trued up you can do it by using a piece of gas pipe, as it grinds away the surface and presents new cutting edges by changing positions. Then take a piece of sandstone about 6 or 7 inches long and a little wider than the thickness of the grindstone; hollow it out to the circle of the grindstone; then hold it on the grindstone, using plenty of water, turning the grindstone moderately fast. It will true it up perfectly with a clean, smooth finish.

When using the scraper on steel use turpentine on it; it will do the work much easier than when dry.

Brushes; paint and color brushes should be kept in clean soft water; suspended by the handle when you are not using them.

To remove rivets when countersunk; center-punch the heads, then drill to counter-sink, and then punch out as usual.

A good paint for boiler fronts and stacks is asphaltum varnish thinned with turpentine.

To keep the solder iron bright use sal ammoniac in water. Dip the iron in this when it blackens, this brightens the iron immediately.

To weld iron to malleable castings use borax and sal ammoniac, one part of sal ammoniac to ten of borax. Grind fine and melt together.

A cure for burns; mix lime water and linseed oil and have always on hand. use equal parts, shake well before using, as it does not combine readily. Put on the injury immediately after burning.

A tempering compound very useful when it is impossible to procure a good grade of steel. To six quarts of clear rain water add one ounce of corrosive sublimate and two pints of common salt. Stir until well dissolved. Dip and draw in the usual manner.

Care and Repair of Mine Pumps

L. R. Swartz

In fitting gaskets to mine pumps it is good practice to cut two gaskets for such joints as valve-box plates and water and caps—in fact, for every joint that has to be opened occasionally for cleaning or repairing the pump. These gaskets should be of thin material of good quality. The metal faces of the joint should receive a good, even coat of tar or asphalt or rope tar, and a gasket pressed into position on each section of the joint. This treatment will effectually prevent water from creeping behind the gasket and eating grooves in valve-box partitions or flanges. It will also prevent the gaskets from being torn by opening and closing the joint.

LETTERING AND ALL BY MR. HANS HANSON

There are various methods of packing plungers. The best and most economical I have found is to put in two rings of new square rubber plunger packing. These two rings of the best of the old packing taken out and finished with two rings of new packing.

The packing should be cut so that the ends of each ring meet without crimping the ring. It is good policy to place the joint of each ring ⅓ or ¼ of a turn to the right of the last ring put in. This will give the least chance for leakage at the joints of the packing. One may move the joint as well to the left. The main thing is to keep moving always in the same direction. Braided flax as rope packing is of very little use anywhere.

The best way to pack the rod is to cut the packing with a sloped lap joint just long enough to make a flat, smooth ring when in place. It is the best policy to use good packing, such as Garlock or Diagonal. There are several good brands of square rod packing on the market. After cutting your packing, give each ring a good, generous coat of rod grease before putting it into place. If the gland and stuffing-box are well cupped you will be surprised to see how much wear can be gotten out of packing placed in this way. When the gland has been drawn up as far as it will go it is only necessary to insert another ring of packing. Flax or braided rope packing sets and becomes like wood in a short time.

When you have packed the rod, use plenty of grease on the rod and do not draw the packing nuts too tightly at first. Draw just tightly enough to prevent leakage along the rod. Then pack waste under and around the rod between the water and steam ends of the pump, and keep plenty of rod grease or train oil in the waste around the rod. A quarter of a turn about once a day on packing nuts will keep the packing all right, if you have a good, true, smooth rod.

Casehardening in Locomotive and Railroad Shops

H. Thompson

We have a spring-furnace here and use it for a casehardening furnace. There are cast-iron boxes to put the material in. We first put charcoal in the box, lay the material in and then add some ground bone; and I have found that by using a little potash sprinkled over the charcoal and ground bone very good results are obtained. We make the boxes as tight as we can by using fire clay around the cover of the box; then put boxes in furnace. In some cases, when we are in a hurry for the material, the boxes have been taken out in four hours, and it was found that the hardening was very good; but as a rule the boxes should be left in the furnace about eight to ten hours, as we think for a good job of casehardening the material should be in the furnace not less than eight hours, and the furnace should be good and hot. Of course, we frequently have to heat many of the small pieces in the open fire when the work is to be done in a hurry, and we then use potash and,

in all cases, for the bath, we use nothing but clear water. At other times we use lead for hardening, and I believe, it is one of the best methods of hardening some material, such as pins, bushings, nuts and small work that is used on locomotives.

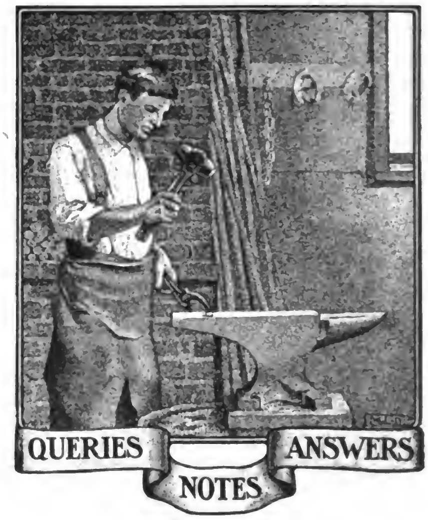
C. A. MILLER.

The important question is to know what to use and when to use it. For a hurry-up job, prussiate of potash in an open fire will give a skin-deep case. If the job in hand is brought to a dark red, or before scaling heat takes place, apply the potash and let it soak in the fire for fifteen minutes, then bring the heat up to a bright red, and dip in cold water. That is an excuse for casehardening. Another way I have done the work, and the best way I know of, is by using one part of cyanide of potassium, two parts of prussiate of potash and three parts of salt, pulverized and mixed. I used a cast-iron box with cover of the same material, the box large enough to take the motion work for one engine. I place about one and a half inches of charcoal on the bottom, cover it with some of the mixture, put in a layer of the work as close as possible, so that the pieces do not touch, sprinkle on more of the mixture, then one inch of charcoal, and so on. Put a liberal supply of the mixture on the top layer of work. Now edge the top of the box with stiff clay and put on cover, then subject the box to a steady, even heat for ten hours, then dip the work in cold running water. It will give a case of steel from $\frac{1}{16}$ to $\frac{3}{32}$ of an inch, but we have been using bone black for several years with very good results. We have a furnace 22 by 36 by 54 inches with doors at each end, a grate eight inches from floor with draft damper below grate, a 12-inch pipe on top of furnace that goes through the roof with a damper in pipe. We use a round pot 12 by 36 inches with a patch riveted on one end with a 1½-inch square hole, so it can be turned, if necessary. We pack the pot in the usual way, giving 1½-inch space between the pieces, put 1½ inches of stiff clay on top and a ⅛-inch steel disc on top and cover it with stiff clay. We start a coke fire of ten inches on the grate, put in the pot and cover with coke and egg coal mixed. We usually put the pot in early in the afternoon, keep a steady heat until evening, then bank the fire with wet smithing coal. We set the dampers properly and the work is ready to come out in the morning without any more looking after. We plunge the work, one piece at a time, into a tank of water 22 by 72 by 36 inches deep, with a 1¼-inch intake pipe at one end at 80-pound pressure and a 4-inch overflow pipe at the other. The work comes out with a case of about one sixteenth inch, which we consider thick enough.

WM. PRICE.

Boxes of various sizes made to suit the work are made of old steel plate. In the bottom of the box is placed a thin layer of old bone black, which has been used once or twice. On this is placed another layer of fresh bone black. The pieces to be hardened have their threaded ends encased in common clay, and knuckle pins have dowel holes filled with same. They are then placed in box at suitable distance apart and bone black packed around them until pieces are covered to the depth of about one inch, the remaining space is then filled with old bone black. The box is covered with flanged lid and is not air tight. It is then placed in spring furnace before quitting time and left without care until morning.

THE SHOP OF MESSRS. YOST AND HALVERSON, MINNESOTA



To Shoe a Forging Animal.—I would be pleased if you could inform me how to shoe a horse that forges.

ADOLPHUS DESORMEAU, Michigan.

A Question on Brass.—I would like to know through our valuable paper how to melt brass in crucibles so it will flow like babbit. A BROTHER, Nebraska.

Who is First in Importance.—I want to ask the craft if they do not think the blacksmith is the first mechanic in importance in the mechanical field. I think he is first and at the head of the field.

VULCAN THE FIRST.

Backfiring in a Gas Engine.—In reply to Brother O. R. Manville, of Missouri, as to cause of gas engine backfiring, will say that backfiring is commonly caused by too lean a mixture. The shooting takes place in the exhaust pipe or muffler.

HERBERT SWANSON, North Dakota.

About Home Made Tongs.—I noticed in the February number that Mr. Sandford E. Frazell wishes to know which is best for making tongs, Norway iron or buggy axles. All the tongs we have are made from buggy axles and they give good satisfaction.

C. H. RISINS, Illinois.

A Question for a Taxidermist.—I have a male goat skin. It is tanned and yet it has the goat smell. I am anxious for someone to inform me through THE AMERICAN BLACKSMITH Journal how to get rid of this smell by the use of some sort of deodorizing chemicals. F. C. MILBURN, Kentucky.

Which Fire is Best?—I have not seen any talks in our paper on forge fires. Which is the best, a shallow or deep fire bed? Which is the cheapest and the best in the long run? Our shop—the interior of which is pictured—has up-to-date equipment—a 4 H. P. Angola engine, a rip saw, a boring machine, a Champion drill, a power blower for two fires, an emery stand and a trip hammer. Our boring machine is our own make and very good. We will send plan of this later. Our shop is 25 by 40 with two stories.

YOST & HALVORSON, Minnesota.

Repointing Drill Shoes.—The best method we have ever found for repointing drill shoes is to buy the ready made points from the dealers and put them on in the place of the worn out ones. You can make more money this way than to try to weld new steel onto the old points.

P. V. BURGESS, Missouri.

Cold Weather Lubrication.—In answer to Brother Bernard Schickling, in regard to having trouble with blower and other machinery on cold mornings on account of the oil being stiff, would say: I live in a country where it is so cold that the water will freeze while boiling on the stove and I have the same trouble with my blower. Just use a few drops of kerosene and you won't have any more trouble.

M. V. JOHNSON, North Dakota.

A Question on Metal Wheels.—Will some-one please tell me through this paper how to repair a steel wagon wheel where half of the spokes are pulled out of the tire? They seem too short to put back and rivet; the hub is cast around the spokes so I cannot get them out. The spokes are oval instead of round and the tire is 4 by ½ by 36 inches high. It is just like a bad rim-bound wheel. I will be pleased to hear from some brother if they know of any remedy.

WM. CRAWLEY, Indiana.

A Well Equipped Nebraska Shop.—My shop is 25 by 64, the first 30 feet being cement floor for shoeing. This we like very well. My power tools are 6 H.P. Olds gasoline engine, 26-inch band saw, No. 2½ Hydraulic cold tire setter, Shaw disc sharpener, 6-foot turning lathe, 50-pound Little Giant Trip hammer, horseshoeing stocks, power lawn mower sharpener, power grindstone, one Champion hand blower, one Royal hand blower, one electric Buffalo blower, one electric Champion blower, one Reynolds hand tire bolter, a power post drill, No. 5 Badger punch and shear, hand power and a No. 5 Edwards hand power shear.

A BROTHER, Nebraska.

Some Montana Prices.—I am a new reader of your paper and I am glad I subscribed for it. I see I can learn lots of things. I have run a shop here in this town for seven years. It is in a country town twelve miles from a railroad, and I am doing a big business. I have two fires, do all kinds of work and get good prices for doing it. Some of my prices are:

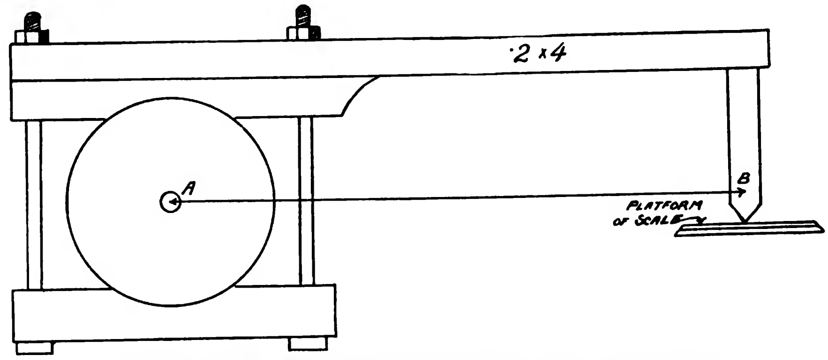
Resetting old shoes	$ .35
New shoes, each	.50
Over No. 4	.65
Neverslip shoes	.75
Pointing and sharpening lays	1.00
Sharpening 12 and 14-inch lay	.40
Sharpening 16 and 18-inch lay	.50
Setting tires, each	1.00
Cutting down wagon wheels, per set	25.00
Wagon axles put in	7.00

ED. MYHR, Montana.

Fitting That Plow Lay.—In answer to Brother Stanford E. Frazell, of Nebraska, regarding the fitting of a plow lay, the way I would do in a case of this kind would be to cut off a small piece from the back end of the land side and it will allow the point to come down lower. Cutting at the dotted lines will not let the point any lower. In performing the above operation if the landside came unwelded and I could not weld it on again, the best thing I could do would be to wait for a dark, rainy night and when every one was in bed I would gather up the old anvil, bellows and hand hammer, and drop them in some old, deep well and go back to the soil.

G. B. JEWETT, Nebraska.

Testing for Horse Power.—In reply to the query of Brother F. O. Gurtis in February AMERICAN BLACKSMITH will say that the prony brake is considered a cheap and good way of testing both gas and steam engines. It works equally well on large and small engines. The engraving illustrates it. The brake arm may be any convenient length.



HOW TO DETERMINE THE HORSEPOWER OF A GAS ENGINE

In figuring the horsepower of an engine, the line A to B is considered the radius of a pulley. The formula is as follows: Radius X 2 X 3. 1416 X speed of engine X weight on scale ÷ 33,000. The brake should be put on tightly enough to make the engine work to its full capacity and not slack speed. The brake blocks on the pulley should be kept cool by oiling or by a stream of water.

HERBERT SWANSON, North Dakota.

Hard Feet and Corns.—I am very much pleased with your paper. I have a new cement shop, 20 by 35. Prices are good here in comparison with those of some of the other smiths over the country. I run a general repair shop and have had plenty of work since I have been in my new place.

I saw an article by E. Heincman in the February number on horseshoeing in Colorado. I have been shoeing horses here for seven years. Sometimes the horse's feet are pretty hard, but that only makes the smith sweat a little and cuss some. When the foot is hard and the horse is lame I pare the foot the best I can, fit the shoe, put leathers on and then apply warm pine tar. This will generally soften the foot so the horse will no longer be lame. I have shod several that way and they have always gotten better. If the horse has corns, trim corn down close, put pine tar in hot sponge and a leather over the foot. I don't think he will go lame long if properly shod.

C. E. SNODGRASS, Colorado.

About Shop-Made Tools.—I enjoy reading THE AMERICAN BLACKSMITH very much and profit by it, too. I run a blacksmith, automobile and machine shop. I have a six H. P. Fairbanks-Morse gasoline engine, a Canedy-Otto power press drill, a home-made emery stand (made from an old dairy queen cream separator), a circular saw and a home-made trip hammer.

One brother smith says in the February number that he thinks we people who make our own machines had better be working at something else and let the manufacturers make such things. I expect he is like some people I have seen. He couldn't make the good tongs he speaks about to say nothing of a machine of any kind, and it makes him sore because somebody else can make them. I think if I can make a machine (in the winter when work is dull) for thirty or thirty-five dollars that would cost me anywhere from one to two hundred dollars, then I have saved the difference. My trip hammer does the work just as well as any I have ever worked with, and I have used several of them.

H. C. KENNEDY, Kansas.

About Blower Fans.—In the March number G. N. Sidders wants to know if the 12-inch fan blower is large enough for the ordinary run of shop work. In reply I will say that I have a 400 Champion blower that I have been using for ten years and have never even had to make an adjustment on it, and it is in good running order.

With regard to the size I would advise a 12-inch fan as being better in every way. It produces a sufficient volume of air for any ordinary shop use and the high speed of the small fan produces a blast of high pressure and that is the result so much desired. A larger fan will produce a greater volume of air, but it lacks the high pressure of the higher speed smaller fan, consequently it does not make as hot a fire. If too much air is forced through the fire it will not have the oxygen all burned out of it, and this coming in contact with the iron while heating causes a very heavy scale to form on it, thus reducing the iron in size and preventing a good weld. This is called oxidizing and will always result when too much air is used.

PAUL V. BURGESS, Missouri.

The Cause of Back Firing.—In reply to Brother O. R. Manville, as to the cause of back firing in gasoline engines, the most likely cause is advancing the spark too far in proportion to the speed of the engine. For example, for an engine of 300 to 400 revolutions per minute the spark should be made at about 10 degrees before the crank comes to dead center. At first thought this would seem entirely too early, but when we take into consideration the fact that the explosion is not made instantaneously it can be understood that this allows the force to be delivered to the piston at the proper moment to get the full amount of expansive force, or in other words when the mixture is compressed in the least possible space. Engines of slow speed should be made to fire the charge later than high speed motors

because of the fact that the momentum of the fly wheels does not cause them to pass over center so quickly and, consequently, should the spark be advanced too far it will cause a sudden "kick" backwards. Another cause, though not so frequent, is an over-heated combustion chamber. The presence of carbon in the combustion chamber which may become incandescent may sometimes be another cause, though this is generally termed pre-ignition.

W. J. McKimmey, Illinois.

A Toe Calk Hardy.—Here is a special cut off hardy for toe calks. The difference between this and an ordinary hardy being the little V-shaped crease on the side. This makes a catch on the inside of the calk prong to hold the calk while welding. This notch in the hardy can be made with a creaser. The device may be of some help to blacksmiths. S. W. Ellis, New York.

Special Tongs.—I haye been a reader of The American Blacksmith for four years and would not be without it for any price as long as I try to run a shop. I read everything I can get pertaining to the trade.

I enclose plans for a pair of tongs which perhaps will interest some of the younger boys if not the older. These tongs can be made to hold square as well as round iron. The engraving will show how they are made.

W. B. Sanders, Tennessee.

Welding Axles and Bending Wood.—An inquirer in The American Blacksmith requests some information about welding steel axles. He says his axles always slip and are hard to stick. Here is a simple means of holding the ends while welding. This is a lock scarf of my own patent. It is made with a fuller and will not slip. Catch a heat about four inches long. Do not dip the axle in sand, but throw a little sand and borax on top of axle while heat is rising. Almost any sort of a heat will weld.

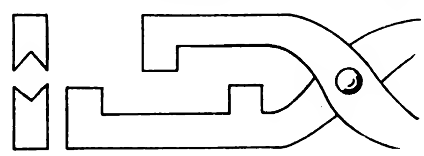
Mr. W. A. Juby of South Africa wants to know how to bend wood. To bend boards heat the concave side and wet the convex side and press over a former. To bend wooden strips such as plow handles, etc., let wood remain in a steam bath for two days, then bend over curve in proper shape and let remain until dry. Make the pattern a little scant, as the wood will open out when dry. W. H. Gunn, Virginia.

On General Topics.—I am very much interested in the pages of The American Blacksmith, because they cover such a wide scope dealing with so many aspects of the craft. On the whole what is interesting to one is not always to another, but here there are plenty of things of interest for us all and none should be too old to learn. I have been at the trade a good many years, but can still find lots of new ideas and useful hints which I am thankful for and have not been slow in taking advantage of. I am very fond of the "Queries, Answers, Notes," some of which are very instructive, and one occasionally which seems simple and ridiculous. For instance, that great record day's shoeing and also of parting the weld, mentioned, I think, in the June issue. I see in the February number where Mr. Nicholas E. Koch of California criticizes Mr. Cochrane about taking the four old shoes off the horse, welding them together and *with them* making four new ones. I think (and we must be thinkers if we read the A. B.) I can solve the problem for him. With the four old shoes welded and made into a hammer he could make the four new ones with it and still have the old ones left, or, as he ought to have put it, have the

HOW TO WELD AXLES

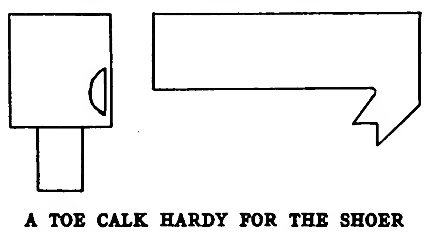
iron left. It would be impossible to have the four old shoes still retain the shape of shoes. J. Tudge, England.

Making the Tire Smaller Than the Wheel.—Mr. W. K. Huff, of Kansas, says in the February issue that he has read so much on tire setting and speaks about having set tires for over thirty years. He says we all know that a tire must be from $\frac{1}{32}$ to $\frac{1}{2}$ inch smaller than the wheel. He wanted some cold tire setter man to explain how he could make a tire smaller than the wheel and do it while the tire was on the wheel. Now we will answer that question by asking him how he is going to keep that wheel in good condition with the tire $\frac{1}{32}$ to $\frac{1}{2}$ inch smaller? I will admit that when setting tires hot we have to make them $\frac{1}{32}$ to $\frac{1}{2}$ inch smaller than the wheel traces show the wheel to be, as he says, but this is owing to



TONGS FOR ROUND AS WELL AS SQUARE STOCK

the condition of the wheel. The wheel, being of wood and not under pressure, the hot tire setter calculates how much the wheel must be drawn down when pressure of a shrinking tire is put on. When a wheel has been contracted until it is tight in all joints, then it begins to dish if the tire is still shrinking. This is the reason your cold tire setter has the advantage over setting hot; you can stop shrinking when you have the required dish, while the hot tire shrinks the wheel until the tire is cold. Now I am not getting anything for writing



A TOE CALK HARDY FOR THE SHOER

this, as Mr. Huff says of Mr. Wright, of Texas, nor do I think Mr. Wright received anything for his writing. Get up a friendly feeling and go and see one of those "horrible machines." Have the owner show you, demonstrate and explain it to you and you'll not want to condemn a machine just because a younger man at the trade is using it and is making good.

A Reader and Subscriber from Colorado.

A Talk on Gas Engine Piping.—I have been reading The American Blacksmith only a short while, the February number being, I believe, my third copy. However, I like your paper and as I have joined the blacksmith's trade I want to be one of the boys and help my brothers wherever I see an opportunity of doing so. In looking over my paper today I noticed the shop picture of Mr. Bert Cross, of Missouri. It seems that he has just installed a gas engine, and as I served my time in a gas engine factory of course it would be natural for me to notice this first. I notice that the water pipe on his engine looks to be lower at the tank than where it leaves the elbow on the vertical pipe. If this be the case he will have some trouble with his engine heating. The water will not siphon sufficiently to keep the engine cool. The pipe being lower at the discharge end a pocket will form in the pipe and enough steam will need to accumulate in the water jacket to force the water out of the jacket. If the pipe were raised a little at the tank the water will flow evenly and keep the engine cool, requiring less lubricant or gas engine oil to keep piston oiled properly. It is very important to have the pipe higher at the tank end than at any other point between the tank and the engine. I would rather use two 45° elbows, one about 12 feet above the engine and the other as near the tank as possible. Or the pipe may be bent up— along bend—being careful not to get the discharge end too low. Always keep the water in the tank a little above the pipe as this makes a condenser and saves evaporation of water.

A. W. Powell, Oklahoma.

Ten Years' Experience.—I thought I would write you a few lines in regard to cold tire setting. To begin with, we have a West cold tire setter. We have used this machine about ten years and have set about 25,000 tires with it, and during that time it has not cost us $10.00 for repairs. I read a good many articles in "Our Journal" about cold tire setting and should judge that the people who wrote them had never used a cold tire setter. I would like to bet some of these gentlemen a reasonable amount that, if we take two wheels and let them set the tire on one of these in the old way, and we set the other with a cold tire setter, the one set with the cold tire setter will stay tight the longer and have less dish. I set tires the old way for more than twenty years all over the United States, Canada and Australia and should know something about the business. Some blacksmiths ask "What are you going to do with a wheel that comes to the shop all loose and rattling in the rim?" When a customer lets his wheels get in that shape he is robbing the blacksmith and waiting for the Lord to set his tires with a little rain. He ought to get all that is coming to him. The blacksmith ought to give him the worst of it. When we get wheels in that shape, if they are not too bad, we saw out the felloes pretty well and throw them in the machine, and get the money and the results, too. If they are too bad, we take them off and wedge the spokes in the rims. This does not make the wheel as good as new by any means, as you cannot fill up the hole in the rim excepting on the outside. When a customer lets his wheels get that bad someone should appoint a guardian over him.

Frank Neagle, Oregon.

VOLUME 10 NUMBER 9

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THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y. U.S.A.

JUNE, 1911

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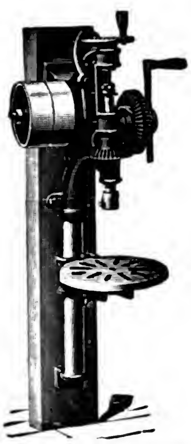

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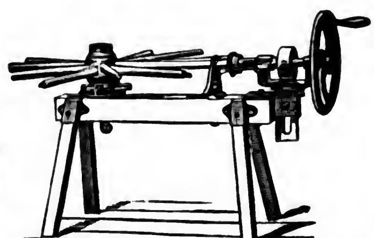

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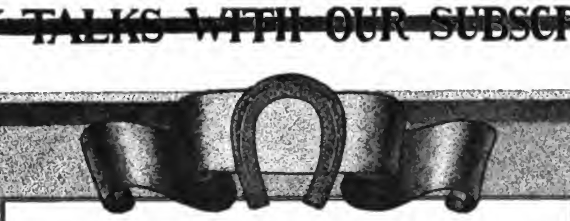

The American Blacksmith is published monthly at The New Sidway Building, Buffalo, N. Y., U. S. A., by The American Blacksmith Company. Incorporated under New York State Laws. Entered, February 12, 1902, as second-class mail matter at Buffalo, N. Y. Act of Congress, March 3, 1879.

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Subscription Price: $1.00 per year in advance, prepaid to any postoffice in United States or Mexico. To Canada and other countries, $1.50, or, 6 shillings. Reduced rates to clubs of five or more on application. Domestic long-time rates, strictly in advance: Two years, $1.60; three years, $2.00; four years, $2.50; five years, $3.00. Single copies, 10 cents. Cable address, "Blacksmith," Buffalo.

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Austin English, Secretary-Treasurer, Kansas State Association, Hutchinson, Kan.

Our Shop Number

We want to make Our Shop Number for 1911 bigger, better and more interesting than any ever before published. We want it to be so helpful and so valuable as a shop equipment issue that every one of "Our Folks" will consider it worth its weight in gold. But to make it such an issue we must have the help of our readers. We want items of all kinds, large and small, long and short. If you know a little kink in operating a drill, a tire setter or any smith shop tool, let us know about it. We want items about smith shop operation. If you have a home-made tool, tell us about it—describe it—send us a sketch. Never mind about your literary style. We'll fix that up. What we're after is the idea. If you will give us the ideas, the hints, the kinks, the short cuts,—we'll see that they get to "Our Folks" in the proper style. But don't put off sending your items. Look about the shop now—surely there are two or three little things that you can write about—items that other smiths will be glad to learn. Whatever it is and it's about some point of smith shop operation, send it in—send it in today. Will you do this to make our next shop number the best ever?

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A Comparison

Do you know, Mr. Reader, that THE AMERICAN BLACKSMITH—"Our Journal"—is the leader not alone in reading quality but in the number of readers as well? It is **the real live paper** in the smithing trade. You, who have read "Our Journal" for any length of time know all about the quality of its reading matter, you know what it is doing for you and the smithing craft. You know about the heaping quantity of reading that you get every month. You know the contributors and writers and what their standings are in the smithing field. You know that the matter published in "Our Journal" is original—and not hashed-over matter clipped from other papers. You know that you cannot find anywhere else on earth the matter that you get in "Our Journal." You, who have read "Our Journal" for any length of time know all of these things, but do you know that in the quantity of readers—actual subscribers—THE AMERICAN BLACKSMITH stands equally high? For example "Our Journal" has more than twice the number of subscribers than that of any other journal of the trade. It has more subscribers than any other two papers in the field.

There must be a reason for this—there is a reason. If THE AMERICAN BLACKSMITH didn't contain the kind of matter that readers want—the matter they can use—the matter they should have—the information of real cashable value—it couldn't outstrip all competitors in this way.

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A NOT UNCOMMON SCENE IN MISSOURI DURING THE WATER MELON SEASON

How To Build A Two-Wheeled Tip Cart

J. L. HILL

A Vehicle Especially Well Suited To Farm Use

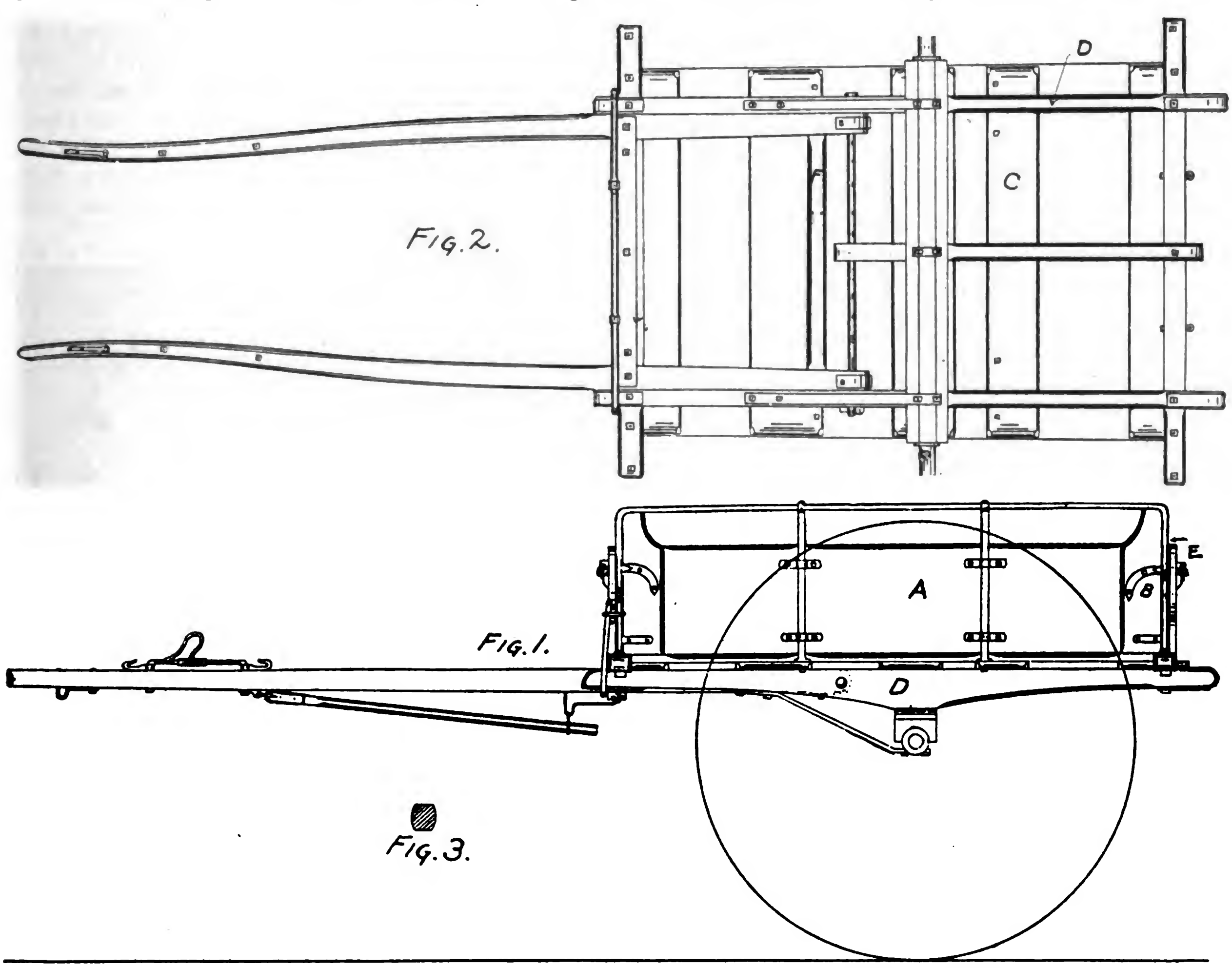
TWO-WHEELED vehicles are chiefly used on the farm and for general hauling work.

Two-wheelers have many advantages, one of them (an important one, too) being that there is a less number of wheels, axles and other parts to take care of and repair. Then, too, they are more easily handled. Take a long wagon and try to turn around in a small space, and then try a two-wheeler, and you will soon see with which one the advantage lies. When properly balanced, this vehicle will not be any harder on the horses than a four-wheeler; in fact, it is not so hard, for the way a wagon tongue bangs from one side to the other on a rough road is nothing short of cruel.

From Fig. 1, the side elevation, a general idea of the construction is obtained, and also the length and height. The side-board, A, is 7/8 inch thick. B is equal to the thickness of the guard irons, E—in this case, 3/4 inch. It is merely a cleat, stiffens the ends of side-boards, and makes the catch for the tail-boards easier to put on, as the surface is level; by running the cleat up to the top of guard iron, it keeps the side-boards firm on the bottom.

To make the tail-board catch, take a piece of 3/4-inch round iron, five inches long, punch a slot in one end, and two inches from this hole draw down to 1/4 by 3/4, then bend as shown. This gives more strength, as the bolts do not follow the same grain in the wood. D is made from hard wood, three inches for heavy work and two inches for light work. Over the axle it is five inches deep and 3½ inches at the ends. C is 7/8-inch soft wood, any convenient width from 6 to 12 inches. The bottom boards are 7/8 inch thick. The feet of the standards, Fig. 6, are let into the bottom from the under side, consequently the guard irons are all in position and fastened before the bottom is put in; after that the sides are put on.

The front and back crossbars are 2½ by 3 inches, of hard wood, and a 3/16-inch plate is fastened on top to take up the wear. These bars are to be 1 9/16 inches above top of D, which



A TWO-WHEELED CART FOR FARM USE. A SIDE ELEVATION AND A PLAN OF THE UNDER SIDE

means that D is checked into the bars $\frac{5}{16}$ of an inch. Fig. 3 is a section of the shaft to show how they are dressed up.

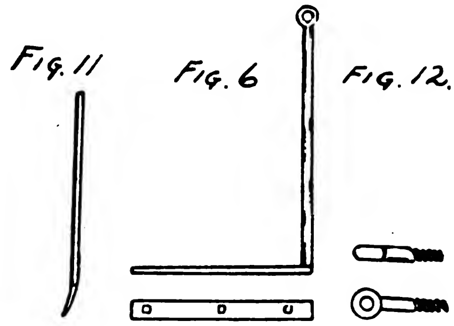
The traveling hook for the back strap or chain only requires to be pushed forward to allow the link to be put in and, when there, it is impossible for it to work out, consequently there is no danger of it getting loose should the shafts be lifted off the horse's back.

The hook on the forward part of the shafts is for an additional horse or two, to pull from. It is made of $\frac{5}{8}$-inch round iron, with a $\frac{5}{16}$-inch bolt through the back. The front is made into a tapered rivet, $\frac{1}{4}$ inch at the riveting point, and goes right through the shaft.

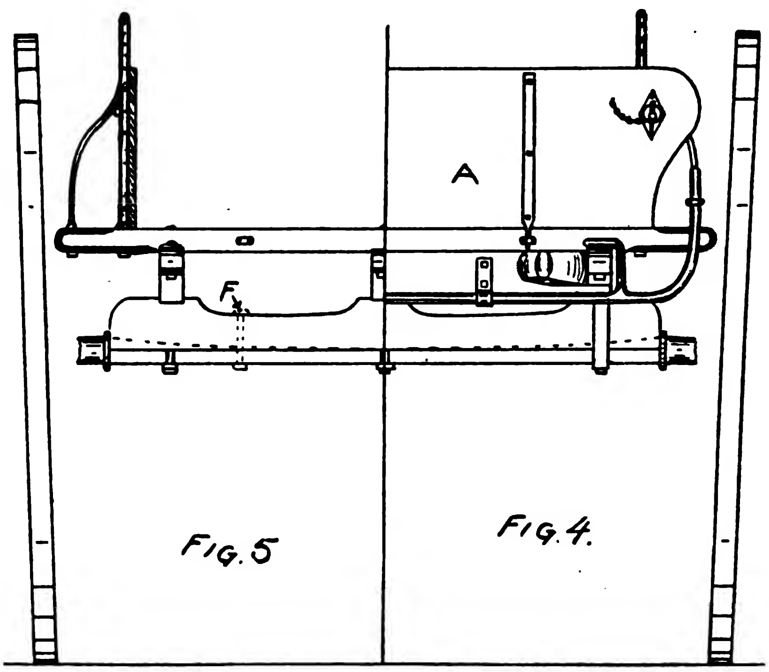
front end under the blades as in Figs. 1 and 2.

Fig. 4 shows the half front, with the method of working the "Tip." It will be seen that all there is to do is to raise the link and pull the handle forward; the body then being released from the shafts will easily tip up. Fig. 10 shows the complete tip iron and how it is attached to the shaft bar. It is made from $\frac{3}{4}$-inch round iron.

Fig. 4, A, illustrates the style of end boards, and how they are kept in place. Figs. 11 and 12 explain this more clearly; Fig. 12 showing an eye bolt, which is put into the crossbars, with a nut on the inside. It is usually made from $\frac{1}{2}$-inch round iron. For Fig. 11 a piece of light old tire comes



DETAILS OF IRON WORK FOR THE CART



A HALF FRONT AND A HALF REAR ELEVATION OF THE TWO-WHEELED CART

The axle is a two-inch Concord, fantailed. This makes it very much lighter, reducing the weight in the center, where strength is not required. The writer has seen some men put in only the stub. They punch a hole in the square of the axle end, and put a bolt through as shown at F, Fig. 5. It is then let into the bed as shown by the dotted lines in Figs. 4 and 5. This bed is 4 by 6 inches, of hardwood, and should be checked about $\frac{1}{4}$ inch over the blades, D, in order to give it more bearing. This axle bed is fastened to the body as shown in Fig. 2 by six $\frac{5}{8}$-inch bolts. A piece of an old tire makes good yokes. Cut two of the three long enough to go forward about two feet and bolt the in handy. Just draw one end down to $\frac{3}{8}$ inch round and point it, then bend slightly forward. The door is put in at an angle, and this bend allows the point to enter the eye bolt and work on the hinge principle.

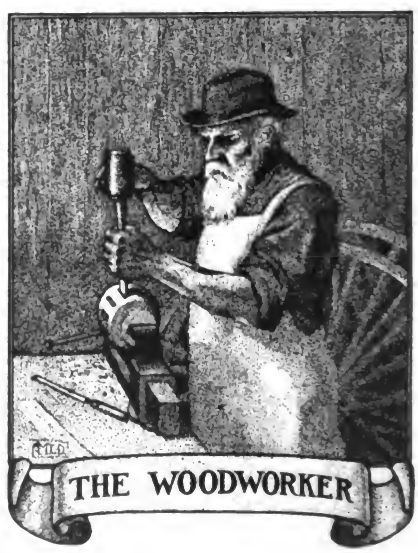
In Fig. 5 is shown an end view of the guard iron and its brace. The guard irons are $\frac{3}{4}$ inch round and the brace $\frac{1}{2}$ inch round, welded to the upright standard, both having a collar as shown. The ends are threaded, one $\frac{5}{8}$ inch, and the other $\frac{7}{16}$ inch. Fig. 9 is the center blade. Owing to the shaft crossbar it has to be shorter than the side ones.

Fig. 6 illustrates the center standards. The foot is $1\frac{1}{4}$ inches by $\frac{1}{2}$, drawn down to $\frac{5}{16}$, and 12 inches long. The upright is $\frac{3}{4}$ inch round, jumped up and welded onto the foot. The eye hole can be made either by upsetting and punching a small hole and gradually swelling it to the required size, or it can be drawn down to half round and bent around a $\frac{3}{4}$-inch bar, and the end then welded into the body of the standard.

Fig. 7 shows two views of the front shaft bar with an iron plate on top, the bolts in the end going through the shafts. In boring through the shafts give the hole a little draw. This will keep the shafts close up to the shoulder of the bar.

Fig. 8 shows two views of the back shaft bar. This is shown in Fig. 2 at F. It is mortised into the shafts just ahead of the iron hinge bar, and the bolt which holds the iron cap in place also holds the tenon. The hinge bar is $\frac{7}{8}$ inch round, with a flat cotter pin to keep it in position. Both the

(Concluded on page 221)



Painted and Bare Rims

S. A. E.

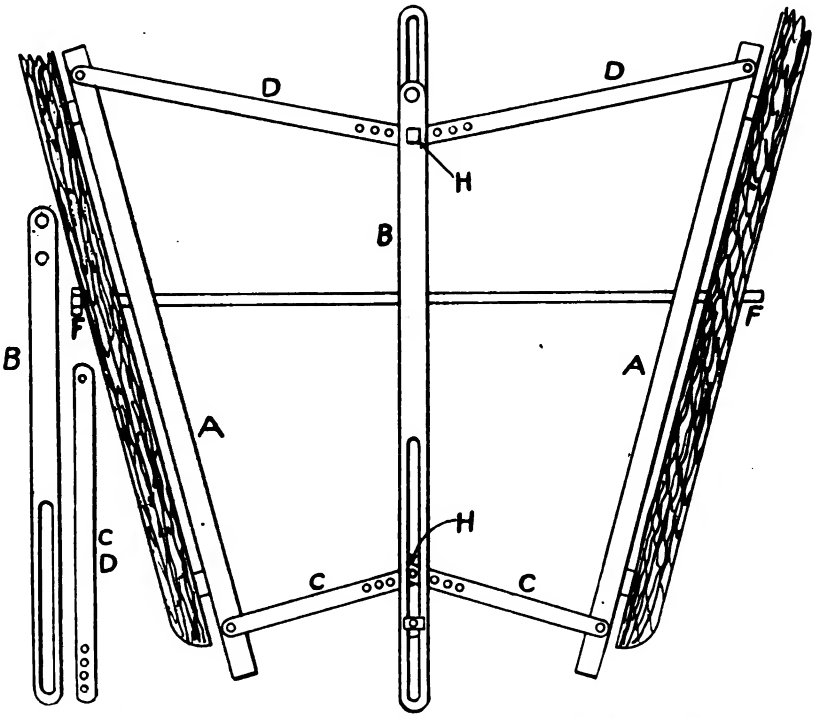
In my time I have worked in quite a number of vehicle factories. Some painted the rim face of their wheels, others did not. In those factories where the face of the rim was painted

they used, with one or two exceptions, a wheel-painting machine which painted every part of the wheel by immersing it in a paint bath. But in the majority of shops they do not cover the face of the rim with paint. And this in my opinion is a mistake. Of course, the tire covers this part of the wheel but it does not lay so close to the wood as to keep out moisture. And the face of the rim without a protective covering of paint is in fine condition to absorb moisture in considerable quantity.

To prove that the painted rim is superior in lasting qualities to the unpainted, I tried an experiment in one factory of which I took charge for a time. Here they had been in the habit of not painting the face of the rim. Naturally, every factory has a percentage of wheels to replace, and in this factory their percentage was as high as 7. While I at first ran against difficulties in having the rim face painted after it had been tried, the percentage of wheels replaced was less than 2½. This, of course, with the same grade of wheels, same workmen and same general conditions excepting the covering of the rim face with paint. This I believe is proof beyond question of the value and practicability of painting the face of the wheel rim.

An Adjustable and Self-Centering Gauge for Fitting Wagon Hounds

Carl Youngstrom



AN ADJUSTABLE GAUGE FOR FITTING WAGON HOUNDS

Did it ever puzzle you to fit a pair of hounds to a wagon tongue so as to have a snug fit and both sides exactly alike? It puzzled me until I made the gauge here illustrated. It is adjustable, and at the same time self-centering. To make it, take a piece of 1½ or 1¼-inch angle steel, 32 inches long, and cut it in the center. You then have two pieces 16 inches long. In the center of each, drill a ¾-inch hole to admit the draw bolt F. From this center mark off seven inches towards each end and drill ¼-inch holes at right angles to the big holes. At six inches from the center bore ¼-inch hole in the same flange as the big hole. Now cut four pieces of iron of the thickness that is generally used for hound irons (⅛ inch) and rivet them to the angle iron, one at each end at the last holes bored. Have countersunk holes in the small pieces so they can be brought up to the inside of the wagon hounds. The two 16-inch pieces are now ready. Now cut two pieces of band steel 1½ by ⅛ by 17 inches long and bore a $\frac{3}{16}$-inch hole close to one end. One and one half inches from the same end bore a hole big enough for a ¼-inch bolt. At the other end make a slit about four inches long and wide enough to allow a ¼-inch bolt to move freely in it. See B B in the engraving. Of the same size iron cut off two pieces eight inches long and two pieces 12 inches long and bore a ¼-inch hole in one end of each of them and in the other ends bore a series of ¼-inch holes about one half inch apart. Be very careful that the two pieces which constitute a pair are exactly alike or the centering arrangement will not be perfect. All the pieces are now ready to be assembled. Take the angle irons A A and rivet the pieces C C and D D to them as in the engraving. Take the two pieces B B and place them with the slitted ends in opposite directions, place the pieces D D between them and put in the bolt at H. The pieces C C are placed in the same manner. It is very important when placing pieces D D and C C that the bolts go through corresponding holes in the pairs, or the gauge will not be true. The length of the straps depends on the width between the hounds, but the length here given was proved sufficient for every wagon that comes my way.

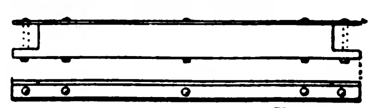


FIG. 7.

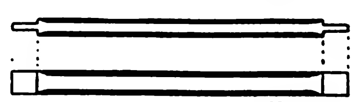


FIG. 8.

FIG. 9.

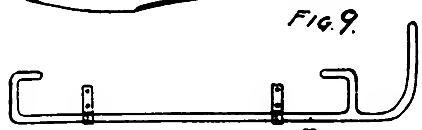


FIG. 10.

MORE DETAILS OF CONSTRUCTION

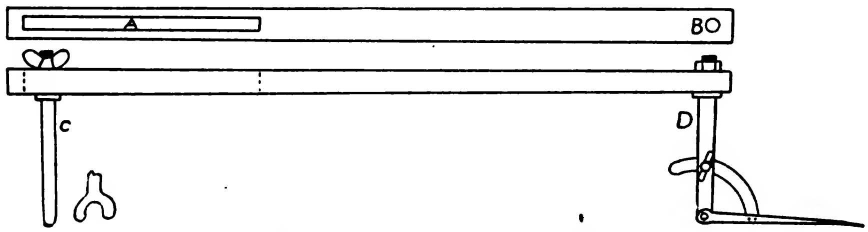
Now, to use it, adjust the straps by putting the bolts H H through the holes which will admit the gauge to slip in easily between the wagon hounds. In drawing the bolts, press the bars B B against each other until A A fit up against the wagon hounds. Now lock the bolts H H, pull out the draw bolt F and push the gauge back so it is released. Now place the gauge on top of the wagon tongue and fasten it in the center of same with two woodscrews. Then turn the tongue over and fit the hounds. Mark the holes in the hounds before you take the gauge off, after which you need it no more for that job.

This easily-made device greatly simplifies the work of fitting wagon hounds and insures accurately-fitted hounds for each job.

How to Make and Use an Axle Gauge

Ed. J. Hoffer

The engraving shows an easily made axle gauge that is inexpensive and yet serves the purpose. To make it, take a piece of hardwood about one inch thick by 1½ inches wide and about as long as the longest axle that comes into your shop. In one end of this piece cut a long slot or hole as at A in the engraving and at the other end bore a hole as at B. Now forge a forked rod as shown at C, one end forming the fork and the other end being threaded to take a thumb nut. A washer is welded on to the threaded end of this rod so that with the aid of the thumb screw it will grip the wood tightly when in use. This rod is shifted along on the wood bar to accommodate different lengths of axles.



A SIMPLE AXLE GAUGE EASILY MADE

The rod D is made from an old buggy top joint. This rod is fitted with washer and thread the same as the forked rod. If not long enough it may be lengthened by welding a piece on at the upper end. The joint is then fitted with a quadrant similar to a pair of dividers, the stationary part of the rod being fitted with a thumb screw at the point where the quadrant passes through it. This arm is arranged in this way so as to allow for different adjustment to different angles.

In use, place the rod C on the spindle of the axle and against the collar. The other end D is placed on the other spindle with the joint of the rod up against the collar. When the axle is set just right, mark the quadrant at the thumb screw. Then get the gather and mark that on the other side of the quadrant. You now have a guide for any other axle with the same dish of the wheel and for the other end of the axle, and by this means you can save yourself much time.

An Ohio Shop Built By a Smith

Samuel Dow

The accompanying engraving shows my smith shop. I did all the carpenter work myself and also all the painting and sign writing. My shop is 24 by 34 with a 10-foot ceiling. I do all kinds of work done in a general blacksmith shop, have a good trade and I have one of the best side lines I think there is for a smith to take up. It is making brooms. It brings you closer to your customer, for he will raise the broom corn for you. Talk it up, you can put in half of your spare time making brooms and the other half you can get rid of all the brooms you can make, and it is not hard to learn. If this will interest our folks I will write again and tell them what is needed to start. I have been at it for several years and one can buy corn or raise it themselves for from $ .03½ to $ .07 per pound.

I read our paper and think it all right. Would not be without it, for it puts me next to our folks. I wish it came every two weeks instead of once a month. I would rather pay more for it and get it oftener.

The Story of Putty

"Hub"

Composition

From days remote putty has been the chief vertebrae of the paint fabric employed in carriage painting. Substances have come and gone, but putty, like the sins of the race, has maintained an apparently impregnable position. It were as tolerable to omit the hub from the wheel as to shuffle putty out of the painter's processes, and while from time to time we have been promised the puttyless carriage its advent is evidently afar off.

The main ingredient—the indispensable one, we might say—of carriage putty is white lead, the basic carbonate of lead, in a dry form. To best meet the vehicle painter's purposes it should have a specific gravity of 6.47, and should weigh approximately 180 pounds per cubic foot.

The question is frequently asked: What are the principal merits of dry white lead, and wherefore its superiority over other substances? In brief, we might reply, the dry white lead possesses all the good qualities necessary to furnish a material strong in its capacity to hold intact against strains and vibration and the general breaking-down tendencies of service. It is a remarkably permanent pigment, and possesses a fine dense body of excellent surfacing properties, by virtue of which not only adequate filling of cavities is obtained, but a quick and surpassingly smooth surface is obtained as well. Experience has taught, however, and is still teaching that, for general purposes, white lead used alone is a trifle too dense in body and heavy in its atoms to furnish the vehicle putty *par excellence*.

To overcome this disadvantage, which, after all, may be considered as merely an incident to the hurry-up demands of modern life, painters long since introduced into the make-up of putty carbonate of calcium or, as it is more commonly known, whiting. This substance, the product of chalk quarries, has a soft, floury composition, is permanent, and used in connection with the lead in proportions, say, of 80 parts lead and 20 parts whiting, it yields the necessary porosity and softness of texture without weakening any of the essential characteristics of the white lead. There are, manifestly, numerous grades of whiting on the market, and perhaps, needless to add, the poor grades should be shunned with great diligence. A finely ground, compact whiting, soft and easy in its working properties, is of the utmost importance for putty-making purposes. In like manner we should advise the choice of high-class varnishes and japans for the liquid ingredients of vehicle putty. Cheap, inferior ingredients, either of pigments or liquids, are to be avoided if permanent results would be had.

Mixing

The mixing of putty is one of those apparently simple operations which

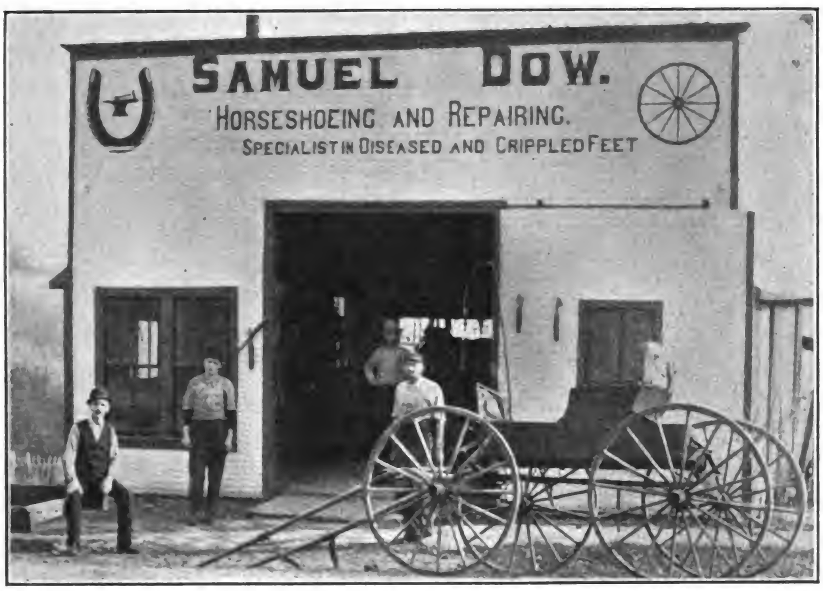
are really difficult—to the inexperienced. Good putty depends largely upon the skill and judgment of the mixer. Not alone is the careful, even precise, proportions of ingredients needful to make excellent putty; succeeding this must come a thorough and uniform kneading of the various components, an energetic working with the hands, along with some moderate taps of the mallet, until a soft, smooth, flexible pigment, flatting freely out under the knife is the result. Now that, as Mrs. Grundy would say, is good mixing.

To be sure, there are various formulas for making putty, each of which, considered from individual standpoints, is the best. It has already been stated that 80 parts of dry white lead and 20 parts of whiting represent a qualified adjustment of proportions for the pigment ingredients. For liquids, employ a first-class coach japan and a grade of rubbing varnish quite above suspicion, using equal parts of each. Of such ingredients, and in such proportions, is the trustworthy and fine working putty made. It is preeminently a general purpose putty, suited to the requirements of every emergency.

For work that is not hurried and has the promise of being exposed to extraordinary extremes of service a putty made up of 5 parts of oil-ground keg lead and 2 parts of dry white lead and 1 part of whiting, mixed to the proper consistency in equal parts of coach japan and rubbing varnish, is a great favorite.

The vehicle painter engaged in the repainting business is also often compelled to conjure up a putty specially adapted to use upon old work—floating derelicts, if you will—with gaping cavities and extended claws of timber in which the regulation putty, while prepared to give a good account of itself, does not thrive to the extent of the putty specially prepared for the work. Such a putty may be made of equal parts of whiting, dry white lead and white keg lead ground in oil. Mix to working consistency in equal parts of thick varnish, either rubbing or finishing, and raw linseed oil. This putty is not intended to be sandpapered, so that in applying it the requisite smoothness should be attained.

Then, too, in the repainting business there are many deep, gaunt cavities—"sink holes" is a common shop designation for them—which call for a special putty. Make of equal parts of whiting and dry white lead, and equal parts of raw linseed oil and coach japan, stirring into the mixture enough plush pickings to make the pigment fuzzy and proportionately raveled. Into the bottom of the hole drive a small-head tack or two as an anchor, and then fill about level with the surrounding surface, slashing the putty across the face with a sharp knife to better expose the mass of pigment to the air. This will hasten the drying, which latter, when accomplished, will permit the workman to fill in and face the cavity up flush with the surface.



A SMITH SHOP BUILT BY AN OHIO SMITH

Manifestly, puttying, in its relation to other processes of the trade, must come under the designation of "common work," but the scarcity of competent puttiers, complained of for the past five years as being widespread, has lent a new aspect to the situation, and men are no longer calling it "common or unclean."

Some workmen are good puttiers, in that they do not miss any cavities or surface abrasions, but in other features their work is inexcusable, being rough and unshorn and costing largely in hand labor to reduce it to the necessary smoothness and levelness. Any cavity or defacement or fracture of the surface should not only be filled exactly flush with the surrounding surface, but it should be so smoothly applied as to require the minimum sandpapering to fit it for the coats to lay over it. Technically, in puttying, the knife should be neither drawn straight across the surface defect nor in a hard and fast circle around it. Rather should the putty be firmly pressed into the fracture, and the knife, during the operation, made to swing in the arc of a half circle. This will cause no rolling or bulging of the putty under the knife, and will yield a surface facing up satisfactory in every particular.

Storage

The good qualities of putty, that is, the future good qualities, are to no small degree dependent upon the character of the storage given it, accepting the fact that the pigment is made quite largely in advance of its daily consumption, as it should be. In the first place, putty is deserving of an excellent system of caretaking, and this should embrace storage in a clean, dirt-proof pail or can with tight cover attached. The putty should be submerged in clean, pure water, and this water should be changed often enough to prevent any stale or rancid condition. No large quantity of water is desirable. Better just a sufficiency to cover the pigment as it is flattened down smooth and level in the storage pail. Then, when a quantity of the putty is required for use, pour the water entirely from the pail and remove the pigment, after which a fresh supply of water may be put on. This practice obviates hammering the putty to expel the moisture which figures as such a resolute bugbear in the calculations of a large following of vehicle painters. Pounding putty simply makes the pigment tough and

leathery, over which the sandpaper has a habit of sliding as though the surface was an example of agate pottery. Personally, we would prefer a mist of moisture in the putty to a fatty and tough pigment over which the sandpaper worketh in vain, even when held down by the muscle of a Hercules. A little kneading of the putty in the hands will usually suffice, under such storage as above suggested, to expel practically all moisture, and it will also suffice to maintain the putty in its original condition. Under right storage conditions the last draft of putty in the batch should work in all respects equal to the first, and when this proves true you may compliment yourself upon having acquired the neat trick of correct putty preservation.

THE USE OF PUTTY

To apply putty successfully to the surface two important essentials are to be taken into account, namely, skill and good judgment. Without these two working in harmony results will not be what they should. The workman may plod along into the round-shoulder state under a load of skill, but lacking good judgment he will quickly lapse into a second-rater. To begin with, it is necessary to learn to use the various styles of putty knives, the square point, the bevelled point, the round point, and the wide glazing knife or French glazing knife as it is professionally known. To the painter expert in the use of the square pointed knife and not familiar with the other kinds enumerated above many disadvantages are naturally sure to attend him. It is therefore advisable that all the various kinds be carried in the tool kit and used at least to the extent of becoming proficient in handling them. Every day, almost, cases are in hand where two or more of the different shaped knives may be, in fact, should be used if the quickest and best results are to be had. There are, after all, comparatively few high-class puttiers—men who know intuitively where to putty, to what extent to putty and, perhaps, above everything else, how to putty. These may be said to be the three senses of the competent puttier. The mere work of filling up a hole in a piece of wood is in itself simple enough and, as a rule, quite devoid of difficulty. But it is the larger problems—the affairs of the head and the hand, as a matter of fact—which require the accomplishments of the trained and thoroughgoing workman. Generally speaking, puttying is among the first and most imperfectly taught processes of the trade, and it is because of this inefficient discipline that not many mighty warriors of the supple knife and plastic pigment are in this generation arising to ornament their craft.

Fastening Hammer Handles

PAUL V. BURGESS

The accompanying illustration will give you an idea of how we keep our hammers from coming loose on the handles. First we set the hammer on the handle, being sure to get a good fit, and then we wedge it as tightly as possible. We next take a $\frac{1}{16}$-inch metal bit and bore two holes in the end, driving two large wood screws in the holes. They never come out and the hammer head does not come loose. The hammer shown in the picture was set two years ago, and has never come loose.

A SIMPLE METHOD OF FASTENING HAMMER HANDLES

How I Re-Painted a Motor Car—2

H. W. LADD

IN "MOTOR"

And the brush marks, instead of being so light that the second coat would obliterate them, were so heavy that the second coat made only a faint impression on them. Consequently, the whole frame, the dash, the bonnet and much of the body looked much as if they had been clawed vertically by an industrious wild cat. By some freak of good fortune I had partially acquired the knack of applying the first coat when I reached the body, and the brush marks on the latter, though heavy, were not so heavy as on the chassis. For the mud-guards I supplied the deficiency with venetian red, purchased at a paint store and mixed with equal parts of raw linseed oil and turpentine. It required two to three days to dry.

My survey of the damage on the morning following the application of the first coat taught me a great deal about painting that I should not have been likely to learn from a book. I decided on reflection that the frame could pass muster as it was, since it was less noticeable than other parts. Regarding the body, I wrote to the paint makers for advice and, meanwhile, although I had been cautioned not to use sand paper or pumice on either of the paint coats, I decided to risk fine sand paper on the dash and bonnet. I was glad I did so, for by using extreme care I managed to reduce the brush marks on these conspicuous parts over fifty per cent without exposing the old blue, except in one or two small spots which I touched up with fresh paint. Meanwhile, the makers of the outfit sent me a can of rubbing varnish tinted to match the second coat, with instructions to apply it over the second coat and rub down with pumice. This addition to the outfit I hailed with joy, as it promised to be, and indeed proved, the salvation of the job.

THE SECOND COAT

On applying the second coat I set myself to learn the knack of brush work anew. In order to minimize the existing brush marks I worked horizontally. I soon found that the best plan was, first, to dip the brush and wipe it out a trifle, then to spread the paint quickly over as much surface as it would cover without skimping, and then at once to go over it *very lightly and evenly* to straighten out the lines, working the brush horizontally with a very delicate stroke. If the brush has not enough paint in it, the bristles will separate and form heavy brush marks. As the paint dries rapidly, one must work fast in order not to touch the paint after it begins to dry, which it does

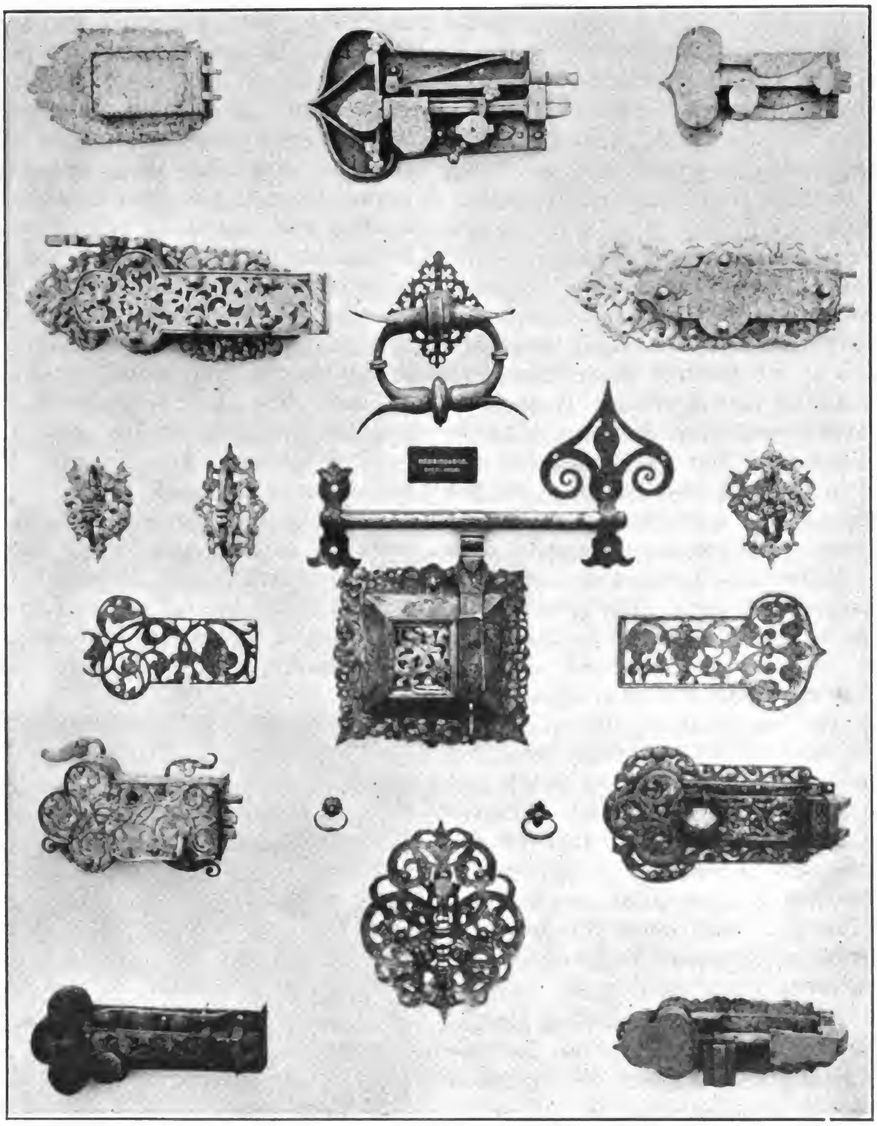
in a few moments. The paint supplied with my outfit dried more quickly than the usual mixture of half-and-half linseed oil and turpentine, and had to be worked correspondingly fast.

I learned in applying the second coat, and with greater force when applying the varnish coats, that it was much easier to achieve a smooth surface on a horizontal surface than on one inclined or vertical. This, of course, was because on a horizontal surface advantage can be taken of the tendency of the material to spread itself smooth, obliterating the brush marks within the first few minutes after it is applied. On a vertical surface, although the same tendency is present, it is immediately followed by a tendency to sag or run if too much material has been applied. On a vertical or inclined surface, therefore, a very nice balance must be struck between applying too little material, which results in leaving brush marks, and applying too much.

The second coat apparently had either varnish or shellac mixed in it. It was a beautiful shade of crimson, and it made a start, although not a very long one, towards obliterating the brush marks of the first coat. I think now that if I were to do the job again I would work the first coat vertically as before, but with considerably less material, in order to leave the smoothest possible surface, and then work the second and varnish coats horizontally. In applying the second coat and the varnish coats I had to work in such a way as to avoid leaving and returning to an unfinished portion. On the smaller surfaces it was easy to start at one end or at the top and go straight across the work to the other end. On the body this was harder, owing to the breadth of the surface to be covered and the rapidity with which the material dried. However, the body was divided more or less into panels, which enabled me to work a panel at a time. In painting the wheels I took the inner surfaces of the spokes, hub and rim first, and endeavored before the paint dried to cover the outer surfaces also. In doing this the rapidity of the work enabled me to turn the wheel frequently to new positions, so that the tendency of the paint to run in one direction was presently counteracted by a new position of the wheel. With a little practice this plan worked very successfully, the appearance of the wheels being excellent.

After finishing the second coat, the brush, which had been thoroughly cleaned in turpentine between the first and second coats, was again soaked over night in turpentine, and was transferred to a covered bowl with enough turpentine to cover the bristles. This was in order to have it easily available for retouching. When the work was finished, all the brushes after cleaning were put into a covered jar with enough raw linseed oil to cover the bristles, thus preserving them for future use.

With the second coat, the work on the running gear was finished, except for the finishing varnish. I now turned my attention to improving the appearance of the dashboard, bonnet and body by means of the rubbing varnish. This varnish I found had to be worked even faster than the paint, owing to the rapidity with which it began to harden. It had, also, a pronounced tendency to flow smooth, but I had to watch the work very carefully for sags and runs, and if any appeared to correct them before they began to harden. I found the best plan to be, to keep an eye on the surface which I had varnished a few minutes before, and if it gave evidence of sagging to wipe the brush out at once and go lightly over the surface to straighten the lines. Several times a sag developed into a run before I noticed it, and in this case there was nothing to do but to wipe it smooth with a rag dipped in turpentine and go over the surface very gently with the brush.



SOME LOCKS, HINGES, BOLTS AND SPRINGS OF IRON, FORGED BY SIXTEENTH CENTURY SMITHS

I found abundant light to be essential, and accordingly I used, where necessary, the extension light of the garage, placing it where its reflections would at once disclose any tendency

to sag. A warm room was insisted upon in the instructions, as the varnish would not flow smooth if cold. This I managed by choosing a warm day for the work. A third requirement, whose importance I did not at first realize, was that dust should be rigidly excluded. What I should have done was to sprinkle the garage floor with damp sawdust and sweep it up before starting work. The garage door was, of course, closed, but that did not prevent dust from being raised from the floor, and greater care would have produced a better job.

The rubbing varnish required a week or more to harden. The rubbing was done with a slab of felt, several inches square and nearly an inch thick, which was soaked in water, dipped into wet powdered pumice, and rubbed in straight lines to and fro, rather than in circles. An abundance of elbow grease finished the job; care, however, being necessary not to rub through the varnish. In point of fact I rubbed through in several rough spots, exposing not only the second, but the first coat, and even the dark blue beneath. As the second coat was transparent, it was necessary to retouch these spots with the first-coat paint, then with the second-coat paint. For some reason there was difficulty in several places in causing the retouched spots to present exactly the same shade of red as the surrounding surfaces, owing doubtless to the retouching being too thick or too thin. In the end, a presentable job was obtained. Enough rubbing varnish was left from the first coat to permit a second coat of the same being applied, and as I was in no particular hurry for the car I took the extra week required for that purpose.

The same brush was used for the rubbing varnish coats as for the finishing varnish, but, of course, it was cleaned carefully in turpentine between coats.

Experience of the behavior of the rubbing coats led me to expect a gratifying result when the finishing coat was applied, and I was not disappointed. It showed itself well adapted to flow smooth over slight irregularities beneath. Two cans were furnished, one for the body, dash, bonnet, etc., the other for the wheels, frame and running gear. The first can was of thinner material than the other, due, as I interpreted it, to the greater liability of the thicker varnish to sag and run on large vertical surfaces.

The heel-board was natural mahogany. I took off the brass edging and latch, sand-papered it smooth, and gave it three coats of varnish, which made it look like new.

Before applying the finishing varnish I had to do the blacking; this looked easy, but proved otherwise. The black pigment was very thick and tacky, but in spite of this fact it dried without gloss. The procedure was to dip the quill pencil and then work out the surplus paint on a pane of glass or sheet of clean tin. The long camels' hairs drooped under the weight of the pigment they held, and the task of guiding them along the rounded beading at the edges of the fenders and the dash proved most tantalizing. Occasionally I had to wipe off an errant streak where the bristles had run off the track, and I was glad of my previous decision not to outline the body panels or doors in black. The black dried over night, and the finishing varnish gave it a brilliant gloss in keeping with the remainder of the work.

The finishing varnish was left a week to harden, and might better have been left longer. In case I had wanted to use the car sooner I could have hurried the setting of the varnish by showering it with cold water.

THE HORSESHOER

The Shoer and the Vicious Horse

H. N. Pope

When a man hangs out his sign he becomes the servant of the public. Of course, he has the privilege of refusing to shoe a horse or do other work if he so wishes, but it is the boast of many a smith that he has shod every thing that came to his shop. If the horse is bad tempered and difficult to shoe and the smith is willing to shoe him, nevertheless, I believe the risk is his own insofar as taking proper care of both himself and the horse is concerned, though, if the horse is injured, the loss, if any, should be the owner's. If the horse owner has no confidence in the ability of the smith it is his privilege to go elsewhere. I firmly believe ugly horses should be put in stocks where they can do no harm. I know some owners object, but I do not believe in running any risk. There is no fun being used for a football and being yanked around the shop floor. The fault in many cases lies at the door of the owner of a bad-tempered animal. A colt is allowed to run until his owner thinks he should be earning his keep, so after a hard chase the colt is caught and a harness is in some way gotten onto him and he is brought to some kind of submission. The poor animal finally lands in the shop where, instead of being kindly treated, he is ill used and, of course, resents it. After hard work he is finally shod. He has learned his lesson, and ever after is ready to fight if his feet are handled. A better way is to get the colt used to being handled. Pick up his feet, use him kindly, take him to some quiet shop and have the rasp used a little, and when the time comes to shoe him I do not believe you will have any trouble.

An Appreciation of the Smith

Peter Peterson

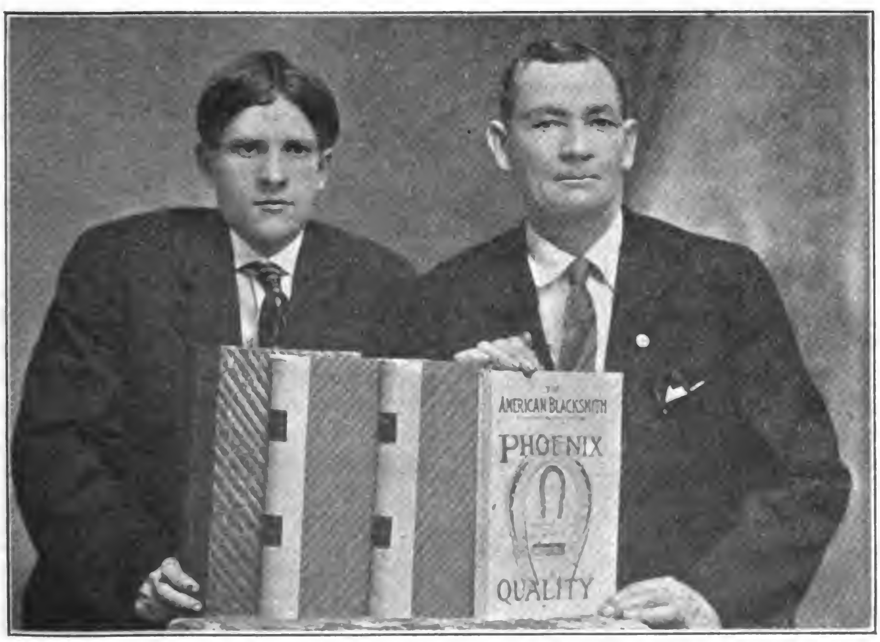
I have been a general blacksmith for thirty-five years, having served my apprenticeship under one of the most competent smiths in the north of Scotland, Mr. A. Alexander, Collaster, Arbroath. I have had a wide and varied experience in the trade, having adhered closely with a keen interest to this occupation since I left school. I am at present 51 years of age and have had full charge of a workshop for 27 years. My own candid opinion is that a man's lifetime is too short—no matter how intelligent he may be—to learn proficiently all that is required of a country blacksmith. There is no occupation that I know of which requires a man to be in sounder health and strength nor stronger mentally and physically in order to perform the hundred and

one varied demands made upon him. But it takes time combined with experience to arrive at this conclusion. I am not stating an untruth when I assert that more men have left this trade than any other occupation in order to engage in something else, simply because they were either physically or mentally too weak to live up to the demands of this most honorable trade. I think you will agree that I am not far off the mark in my assertion. Bearing this in mind, on receiving your letter about a year ago requesting me to peruse your practical journal for a year, I did so with pleasure, and find that although it treats on some branches of the trade which I have not as yet had occasion to practice, there is a lot of information to be derived from it by each and every man in the trade. I am certain there are many intelligent blacksmiths well charged with rich information regarding the trade, but these are the quiet, modest fellows who seldom wield the pen of friendship. Now, please give us one or two of those little tips of yours that make work easier, for wisdom is strength.

Binding Our Journal, and a Pile of Old Shoes

J. D. Ferrell

The accompanying engraving shows myself and a friend, Mr. D. W. Collins, holding several bound volumes of "Our Journal." I bound these up myself and have three very nice books. The advertisements I have put in separate covers and they make quite a good sized book. I don't suppose that any of the other brother smiths have done this, as I have never seen anything about it in the journal. The other picture shows the old horseshoes which I have taken off in the last two years. The pile of old shoes is 8 feet high and 6 by 9 feet at the base.



SOME FRIENDS OF "OUR JOURNAL" AND THEIR BOUND VOLUMES

The Other Side of Blacksmithing

G. E. Settles

I believe the poor blacksmith has the hardest time of any mechanic in the world. His customers never think it too cold or too hot for him to work. They will go to his shop when it is too cold for them to work, taking their reel-footed horses for him to shoe and, if he happens to put on a shoe crosswise or hind part before, or if he fails to keep a grindstone with a patent crank and rollers upon which they may grind their grubbing hoes and axes, they will call him bad names. Furthermore, they will go to the shop when it is too hot for them to work on Saturdays and carry four days' work and, because the smith cannot do it all in one day, they will call him old and slow, when he has not had time to straighten up his back for three days. They will make him wait twelve months for his pay, and then if he doesn't have three sworn witnesses by which to prove every item they will dispute his account and, if they agree on some items, they will say: "Come over, Old Man, and get some turnips or onions." I knew a good blacksmith who sung and worked himself to death around

MR. FERRELL'S PILE OF OLD SHOES

his anvil, and he had to take a lot of such stuff. He had one old customer upon whose plow he had to put a lug every spring. For this he received a small cake of tree sugar, his two little girls eating the sugar before he could get the iron hot enough to do the work. I believe the blacksmith has the hardest time of any mechanic in the world.

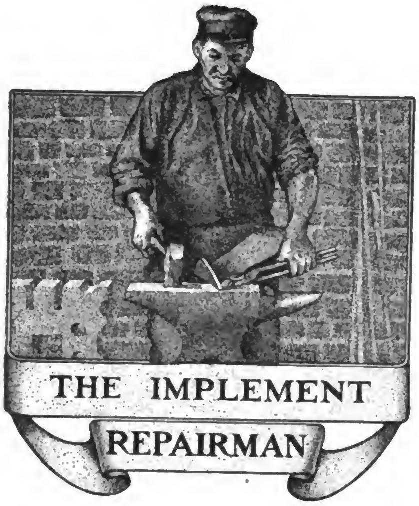
A Chance for the Poor Boys of Pennsylvania

Through the generous provisions of the will of Thaddeus Stevens and the benevolence of the Commonwealth of Pennsylvania, The Thaddeus Stevens Industrial School was founded for the purpose of educating the poor boys of Pennsylvania. The school is located in the City of Lancaster and is now engaged in teaching brick-laying, carpentry, pattern-making and machine trade. Boys must be 16 to 18 years of age to gain admission and have a common school education. They must be of good moral character and reside in the State.

Poor orphan boys have preference. The course will require three years, during which time they are given clothing, board, lodging, one of the trades and a good high school education.

Those of our readers who know of some deserving boys (residents of

Pennsylvania State) who would be glad to avail themselves of this opportunity, will assist an excellent work by communicating with Mr. William Mellor, Superintendent, The Thaddeus Stevens Industrial School, Lancaster, Pennsylvania.



How to Forge a Hammer

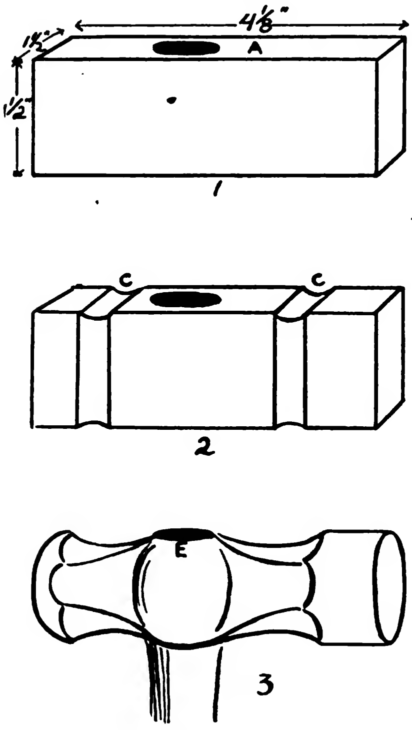
J. N. Bagley

In forging the hammer many little things must be considered that do not seem to amount to much at the time, but if we are not careful to do the right thing first our hammer will not look right after it is forged. The following way I find a good one in forging a two-pound hammer. I use 75 point carbon steel, 1½ inches square and 4⅛ inches long. Have the fire well heaped and free from sulphur (sulphur is very injurious to steel). Place the block of steel in the fire and heat very slowly, turning it in the fire to insure an even heat. Heat to a bright yellow and punch the eye as shown at A. Next in order will be to fuller the block of steel as shown at C. After fullering, the hammer is carefully forged until it has the shape shown at E. Fuller the eye of the hammer a little wider at the outer edges to make it hold the handle better. Harden and temper in the usual way.

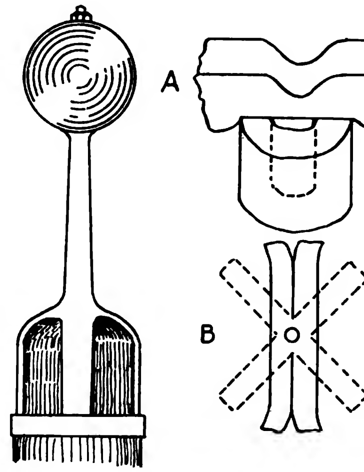
Forging a Mast Tip

Bert Hillyer.

On top of the mast of the lighters or boats used to load and unload cargoes from the wharf there is a forging that has four straps which fit round the top and then run a short distance down the sides of the mast. There is also a stem with a wooden ball fastened on the end which runs up. A few years ago, before soft steel was used extensively, these were made of iron. The straps were welded across one another and the stem jumped on. This was done by taking two pieces of 1¼ by ½-inch iron, upsetting it well in the center and taking a boob punch and scarfing each side where they crossed in welding. After welding, a small hole was punched in the center. The stem was then made by upsetting the end and working a scarf all around with a small stem in the center. When both pieces had reached a welding heat, this small stem was put through the hole in the strap and the scarf welded up. Another heat was then taken on the end which protruded through the strap. When at a welding heat it was turned over and put in a heading tool that had been countersunk, and welded up. The straps were then bent to the shape of the mast end. Then a collar was welded on the stem upon which the ball was to rest, and a nut screwed down on top to hold it securely. Before the ball was put on, the straps on the side were let in. Very near flush with the wood, a band was made and shrunk on over straps, which helped to hold them. The reason the forging is made in this way is to hold it firmly, so it will not work loose. If it were a straight rod which went down into the center of the mast the constant rocking and jerking of the boat would soon cause it to loosen.



HOW TO FORGE A HAMMER



FORGING A MAST TIP

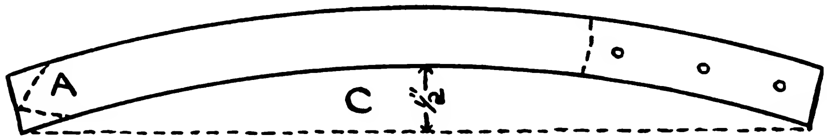
To make this forging from soft steel, take a piece of 6 by 2-inch stock and draw down the stem to 2 inches round by 7 inches long; then cut off 3 inches back from the stem. This leaves a piece like a T-threaded bolt. This is put in a heading block and a piece of round iron laid on top. This is then driven in with the steam hammer, leaving us a piece as at A. This is then taken out of the block and each end is drawn out, leaving a rectangular piece, 1 inch by 2½ by 14 inches long. Bend one end over, in order to hold it fast with tongs, and fuller the 2-inch round piece down to 1⅜ inches. Then draw it tapering to 1 inch and about 15 inches long. Now forge the collar and draw piece in front down to ¾-inch round. Heat up the rectangular part and split it in the center with the hot chisel to within $\frac{5}{16}$ of an inch of the stem. The ends are then thrown out, (as at B) by working a fuller from top to bottom. Now bend the stem back, using it as a handle in drawing out the straps. To draw out these or any other stock, quickly, take a piece of round steel, place it on top of the stock and keep rolling it as the hammer strikes. When near desired size, stop and finish in the usual way. This forging is made on the same principle as the weathervane that I described a few months ago; the only difference being that the weathervane was blocked out in a cross before the arms were split, while this forging is blocked in a T-shape.

How to Forge a Butcher Knife

J. N. Bagley

It is some little trick to forge a butcher knife and have it come out

in the shape that is wanted. The following way I have found to be very good for forging a butcher knife Use steel of about 75 points carbon, about ¾ by ⅛ inch. First decide on the shape of the shank, whether it is to be round or flat. Next determine the length of the blade, and with a chisel cut the corners as shown at A and bend the steel as shown at C (about ½ inch for an 8-inch blade). Heat the blade to a deep red heat for about half its length and draw to a thin edge, hammering it evenly on both sides beginning at the point. Heat the other half and draw until the point is reached and the blade will come out perfectly straight. Now



HOW TO FORGE BUTCHER KNIVES

flatten the point a little, making it wider than the blade of the knife. Do not try to forge the point of the knife to shape by pounding it on edge, but cut it with a chisel. To refine and pack the steel, heat to a very low heat and hammer from both sides until the color leaves the blade. Heat the second time, and instead of hammering the cutting edge hammer the blade in the center, cool off and file the edges straight and the blade is ready to be tempered.

How to Build a Two-Wheeled Tip Cart

(*Continued from page* 212)

back ends of the shafts and the front and back ends of the blades are capped with iron. The shaft caps, however, are light, but the others should be ½ inch thick on account of the wear on them.

For painting, an attractive combination and a good wearing one, too, is to make the body light blue, mixing ultramarine blue and white lead. The chamfers and other striping are bright yellow; axle bed, shafts, blades and wheels bright red; guard irons, axle, clips and other iron work, black.

Farmers will find this the handiest of vehicles for use on the truck farm. It can be turned in a small space, can be easily moved in the barn and is just the thing for handling all manner and kinds of material quickly.

What to Charge for Re-Painting Vehicles

W. A. Riggleman

There are a few prices one should get in all small paint shops which are connected with horseshoeing and general repair shops to make painting pay. There should be four styles or methods and four grades of prices for repainting—the revarnish jobs, color varnish, medium, and the first-class jobs. In this way you can have system in your paint shop, and can surely catch your customer through one of them.

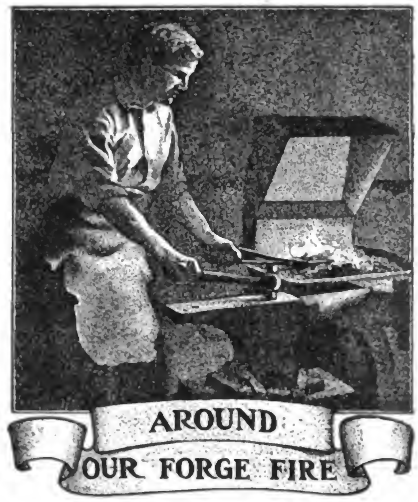
The following prices apply to revarnish jobs: For buggies or any light one-seated job, $5.00 to $7.00; light two-seated carriages, $6.00 to $8.00; cab or heavy jobs, $8.00 to $10.00; automobiles, one-seated, $9.00 to $11.00; two-seated automobiles, $10.00 to $15.00.

Color varnish jobs: Buggies or light jobs, $7.00 to $9.00; light carriages, $8.00 to $10.00; cabs or heavy jobs, $10.00 to $12.00; automobiles, light, $12.00 to $16.00; heavy, $14.00 to $18.00.

Medium jobs: Light buggies, $9.00 to $11.00; light carriages, $12.00 to $14.00; cabs or heavy jobs, $15.00 to $17.00; automobiles, light, $17.00 to $19.00; heavy automobiles, $20.00 to $25.00.

First-class jobs: Buggies, $12.00 to $15.00; carriages, $14.00 to $16.00; cabs or any heavy jobs, $18.00 to $22.00; automobiles, light, $19.00 to $25.00; automobiles, heavy, $25.00 to $30.00.

You will find these prices about right for the various methods of repainting I explained to you in a previous article. You can, of course, lower or raise these prices; it depends on what part of the country you live in. If you do your repainting as I have outlined it you can lower the prices on other items and still make a fair profit out of your paint shop and pay your painter fair wages. Learn to take advantage of the jobs you have to paint. I mean learn to estimate the condition the vehicle is in. You may not have to do much to it and get a good price just the same. A number of painters cannot see it that way, but just go ahead and apply a lot of coats and work when it is not necessary. They have one old way and cannot get out of it.



"Say, Benton," said the Editor as the recipe-man came into the "forge room." "What have you got in that book of yours that will protect horses from flies? There are a number of readers who want some hints on the subject and I think you can help them out."

"I think I have several recipes for fly solutions," replied Benton, taking out his book. "Here we are: Oil of tar is used for protecting horses from flies. Concentrated oil of laurel is also effective. A strong decoction of smartweed is also good, while another formula is made up of one pound of asafoetida, a half pint of vinegar and one pint of water. These fluids are harmless and may be sprayed or brushed on the horse's legs, neck and ears and other points where the flies are especially troublesome."

"I guess that is just what our readers want, Benton" said the Editor. "And now, where have you been for the past month?"

"I was down around Harrisville, and incidentally called on Jim Cruver. And this fly dope reminds me—Jim has just built a new shop and has it entirely fitted with screens. There's a thing I've often wondreed about—why don't more shoers fit their shops with screens? There's no reason why it can't be done and, if the screens are properly cared for, the added comfort to the horses and to the men shoeing the horses will pay for the screens in a short time. A good many shoers could make the screens themselves during their spare time, and with a coat of paint every spring and an occasional overhauling they would last a good many years. And then, too, the advertising feature must not be lost sight of; people would like the idea."

"I don't see why it wouldn't work. There are a number of shops that are fitted with screens, but the number could easily stand increasing." And the Editor turned to look over some proofs from the printery.

The Blacksmith's Dream

(With Apologies)

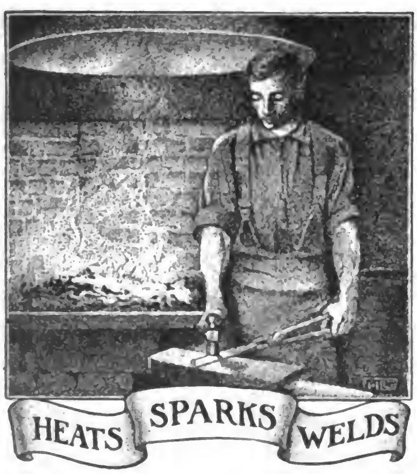
Last evening I was talking with a blacksmith aged and grey,
Who told me of a dream he had—why just the other day.
While dozing in his smith shop a vision came to view,
He saw an angel enter dressed in garments white and new.

Said the angel; "I'm from Heaven. Saint Peter sent me down
To bring you up to glory and put on your golden crown.
You've been a friend to everyone and worked hard night and day.
You have done work for thousands and from few received your pay."

Then the blacksmith and the angel started up to glory's gate,
But when passing close to Hades, the angel murmured "Wait!
We've got a place to show you, it's the hottest place in Hell
Where the ones who never paid you in torment are made to dwell."

And, behold! the blacksmith saw there his old debtors by the score,
So he sat and simply watched them—he could wish for nothing more.
And the waiter brought him juleps, iced and cooling, and a fan
And the blacksmith watched his debtors singe and sizzle in the pan.

Here it was the angel found him. "Come on, blacksmith, follow me."
But the blacksmith only answered "This is Heaven enough for me."



Certainly, wise men make mistakes, but they don't repeat them.

It's the now in the proposition that makes the difference between success and failure.

The real Captains of Industry are those men who support families on small incomes.

Success does not lie in taking some other man's job, but in making good in your own job.

The hum at Thornton's is no relation to the ho-hum you generally hear at Tom Tardy's.

Wonder if that "room at the top" notion didn't originate with some maker of hair restorer?

It pays to be honest, and the man who doesn't think so and believe so is nothing less than a fool.

Mr. Employee, the man with initiative is the one who does things without being told. Have you initiative?

Go through the motions of maintaining a lively business. You'll be surprised to see how lively your business is.

'Tis better by far to be a live man in a dead town than a dead man in a live town. Under which head do you come?

The loose boards in Tom Tardy's shop floor squeak loudly of his loose methods every time anyone comes into the place.

Are you getting all the trade you should have? Some good advertising will help you win more trade—good work will hold it.

Different shapes and different metals require different cutting wheels. When in doubt, ask the maker of your grinding wheels.

It's not always the fault of the business if you don't succeed. After careful, honest investigation you'll generally find that it's your own fault.

Why not offer a discount for cash if you are troubled with long credits? One smith we know allows his cash customers a discount of five percent.

Work when you work and play when you play, but don't dream during working hours of the baseball game or worry about business when on your vacation.

Are you making profits or just expenses? Perhaps you know and then again, perhaps you don't know. Better find out before saying that smithing doesn't pay.

No sir, we don't accept quack medicine, fake gold mine or other questionable advertisements. Our Pink Buffalo Stamps and Honest Dealings paragraph protect "Our Folks."

Did you ever hear of a business man winning success by poking his nose into the business of his competitors? Business successes are the result of paying strict attention to business.

Don't keep the shop windows and doors closed these days. Let the sunshine into the shop and it will find its way into your heart. For a shop full of sunshine fills the heart full, too.

Of course "Our Journal" deserves that fifty thousand subscribers. Every present reader knows that, but we can't reach that figure without your help. Get your neighbor to subscribe today.

John Deere made his first steel plow in 1847, and ten years later was making ten thousand steel plows a year. Now the Deere plow factories turn out a complete plow every thirty seconds.

It's not a question of sentiment—it's business. Collect sharply, buy close, insist on a fair profit and do good work. If you do these things you'll not be able to keep success from your doors.

Are you prepared? You'll find there's more money in it this year than ever before. And there will be a larger need for work on automobiles. Are you prepared to handle your share of this work?

Don't fail to file the catalogues you receive from jobbers and manufacturers. Keep them with some attempt at order and system. Then you'll be able to place your hand on the one you want, when you want it.

Of course, your selling prices are keeping pace with your costs! If not, you'll soon be minus your business. No business can be run at a loss. And you lose money if you don't advance your prices when costs go up.

An unpaid bill is like a man—The older it gets the harder to do anything with. Collect the bills when they are young and you'll have less difficulty. And the same applies to the bills we owe—they're easier to pay when young.

How about that collection of junk about the exterior of the shop? About time to clean it up. Save what you can and sell or burn the other. Wind and weather don't improve such stock, and it's a poor advertisement for you, your shop and your work.

Does your jobber handle American Blacksmith Subscription Coupons? If not, tell him to get them. They save you time and trouble when subscribing to "Our Journal." Don't forget to ask your jobber about American Blacksmith Subscription Coupons.

Don't forget the garden. Every man, no matter how busy, has time for a few minutes each day tilling the soil. And you'll feel better for getting close to nature after pounding hard iron. And then, too, it's a poor sort of man who hasn't a place in his makeup for flowers.

How are your collections? Are you keeping them down or do you allow your customers to make promises and then not follow them up? You can't support your business on the money outstanding, any more than you can build a house on the foundation under your neighbor's home.

Everyone admits that the cost of living is higher today than a few years ago, and yet we are giving "Our Folks" more good solid reading matter now than we ever did before and at no advance in price. "Our Journal" now contains three hundred and twelve pages of reading matter a year, instead of but two hundred and forty pages, as it did several years ago.

We heard an employer of many men give some good advice to one of his help. The man in question had been in the habit of taking an occasional drink during working hours, until one day his employer said to him as he returned from his usual drink: "Tom, I want you to cut it out. If you must drink, don't do it until after your supper at night." And there's more sound sense to that than appears at first sight. Did you ever hear of anyone drinking to excess after eating a full meal?

For hauling the girders for the new municipal building in New York City the Meade Transfer Company planned and built several special trucks the largest of which cost $5,000. The wheels of this truck are of solid cast steel 14 inches wide and three feet in diameter. The axles are 14½ inches thick in the center, seven inches at the ends and weigh 2,200 pounds. The king bolt is four feet long. The wagon contains four tons of bolts and rings. Some of the steel braces are 4½ feet long and require four men to lift them. The truck is 75 feet long and weighs 18 tons without anything on it. Its guaranteed capacity is 100 tons. The builders of this monster truck were J. A. Shepard and Son of Brooklyn.

Our Honor Roll

If your name is not on this list, you can place it here by taking advantage of Our Special Long-Time Rates. This list is revised every month—here are our special rates—do it now.

	U. S. and Mexico.	Canada.	Other Countries.
Two years	$1.60	$2.40	10 shillings.
Three years	2.00	3.40	14 shillings.
Four years	2.50	4.35	18 shillings.
Five years	3.00	4.90	1 Pound.

And when you ask a neighbor to subscribe show him this list. A paper with such a list must be valuable and practical.

R. S. Crisler, Kentucky.........Jan., 1920
T. P. Considine, Massachusetts..Dec., 1918
Richard Brenner, Texas.........Feb., 1918
C. J. Hall, Washington.........Dec., 1916
G. N. Follmar, Nebraska.....March, 1916
W. Willoughby, Michigan.....March, 1916
H. Hoffmeyer, New Jersey....March, 1916
Frank L. Locke, New York...March, 1916
Frank L. Evarts, Connecticut.March, 1916
Chester Humbert, Wisconsin....June, 1916
M. Broton, North Dakota......June, 1916
C. H. Cairns, New York........May, 1916
D. E. McDonald, Florida.......April, 1916
W. H. Winget, Vermont.......April, 1916
George Howard, Kansas .....March, 1916
C. R. Winget, Vermont.......March, 1916
E. P. Jones, Kansas...........Feb., 1916
A. Tillman, California..........Feb., 1916
M. Klitgord, New York........Jan., 1916
O. Stenning, South Dakota.....Jan., 1916
Iver Johnson Arms and Cycle Works, Massachusetts........Jan., 1916
Feldmeyer & Schaake, Kansas..Jan., 1916
Jas. A. Sharp, Massachusetts....Dec., 1915
J. Krahulec, Illinois............Dec., 1915
P. E. Dahlfurst, California......Dec., 1915
Wm. Bisher, Ohio ....Dec., 1915
C. A. Jerner, Nebraska.........Dec., 1915
G. S. Fisher, Nebraska.........Dec., 1915
Printers Supply Company, Nebraska ....Dec., 1915
M. Kennedy, Tasmania........Dec., 1915
Williams & Turner, W. Virginia.Dec., 1915
C. J. Ash, Kansas............Dec., 1915
F. H. Joslin, Massachusetts.....Dec., 1915
C. W. Ames, Massachusetts.....Dec., 1915
C. L. Sorensen, Nebraska.......Dec., 1915
E. Williams, New York........Dec., 1915
W. Urquhart, New Zealand.....Dec., 1915
W. Rupe, Oklahoma...........Dec., 1915
L. S. Kocher, Iowa............Dec., 1915
D. Codere, Illinois.............Nov., 1915
F. S. Woody, Iowa............Nov., 1915
George H. Ilsley, Massachusetts.Nov., 1915
M. I. Huff, Missouri...........Nov., 1915
Stephen Wachter, Pennsylvania.Nov., 1915
C. C. Perry, Australia..........Oct., 1915
Sidney Stevens Imp. Co., Utah..Oct., 1915
W. H. Findlay, New Zealand....Oct., 1915
R. F. Watson, California.......Oct., 1915
H. R. Stone, Connecticut.......Oct., 1915
F. Teuber, Georgia............Oct., 1915
Ed. Hammill, California.......Sept., 1915
R. D. Simkins, Pennsylvania...Sept., 1915
T. J. Reynolds, Pennsylvania..Sept., 1915
Wm. Bates, Texas..........Sept., 1915
J. Knight, England ....Sept., 1915
A. Chargois, Queensland, Aus...Aug., 1915
A. M. Byfield, West Australia...Aug., 1915
C. E. Allen, Nebraska..........Aug., 1915
M. J. Roder, Montana..........Aug., 1915
J. E. Lyon, Texas.............Aug., 1915
F. W. Krenz, California........Aug., 1915
Jos. P. Rotolinski, Massachusetts.Aug., 1915
Jas. A. Buchner, Michigan.....July, 1915
G. N. Ferree, Utah............July, 1915
T. O. Chittenden, New Zealand..July, 1915
The Goldfields Diamond Drilling Company, Australia ....July, 1915
J. A. Lawton & Sons, South Australia ....July, 1915
I. Murray, South Australia.....July, 1915
J. W. Ivil, Utah..............June, 1915
E. L. Herving, Florida.........June, 1915
E. E. Mercer, Kansas..........May, 1915
A. E. Spangbery, Oregon.......May, 1915
J. P. Chiappa, Bermuda.........April, 1915
W. Whitbread, South Australia.April, 1915
J. L. Steelman, Washington....April, 1915
R. E. Pethrick, Pennsylvania...April, 1915
Wm. McCurdy, Oregon........April, 1915
Chas. Schmidt, South Dakota...April, 1915
Arthur Seewald, Illinois ....April, 1915
T. E. Birchmore, Georgia......March, 1915
L. D. Campbell, Iowa.........March, 1915
Jos. Hiemenz, Minnesota......March, 1915
John L. Schulte, Missouri.....March, 1915
Z. M. Wesley, Missouri.......March, 1915
Wm. P. Schrink, Montana.....March, 1915
C. Vogel, Nebraska...........March, 1915
F. Townsend, New Jersey.....March, 1915
C. D. Camp, New York........March, 1915
A. Thalmann, Tennessee......March, 1915
J. J. Purinton, Ohio..........March, 1915
W. H. Leonhard, Pennsylvania.March, 1915
W. A Shive, Pennsylvania....March, 1915
R. L. Killingsworth, Texas....March, 1915
Van den Wildenberg Brothers, Wisconsin ....March, 1915
V. Priessnitz, Wisconsin......March, 1915
F. J. Ties, Wisconsin..........March, 1915
J. Marshall, Indiana..........March, 1915
H. D. King, New Jersey......March, 1915
W. E. Bedford, North West Territory ....March, 1915
G. H. Longley, Massachusetts..Feb., 1915
H. N. Seeley, New York.......Feb., 1915
J. A. McGaughey, Washington..Feb., 1915
A. E. Roesner, West Australia..Jan., 1915
Alf. Seidel, Nebraska..........Jan., 1915
Brown & Peterson, North Dakota.Jan., 1915
H. F. Schreiber, Pennsylvania...Jan., 1915
A. C. Elder, Georgia..........Jan., 1915

Solving the Credit Problem

GEO. N. FERREE

Here is an important matter I should like to put before the readers of "Our Journal" on the credit proposition. I would like to hear from a great many on this subject who have given or who are now giving credit to the wrong people. It is not so much the credit business which puts so many people in poor circumstances as it is the non-collection of honest debts. Almost every shop must do some credit business, and what we want to know is with whom we are doing this credit business; what sort of reputation the customer has. It is not a pleasant duty to ask a person who wants a little credit for about a week or a month all kinds of questions about his promptness in paying his bills. So why not have a credit application which we may ask him to fill out, stating how much credit he will want during the stated time, and what the stated time will be (not over thirty days, unless special arrangements are made). It will give them the feeling that you expect them to pay their accounts when due, that is, if credit is extended to them. After the application has been properly filled out you can go to the phone and call up their references and note what each firm reports. If the report is favorable or not favorable you may let them know, keeping the application on file for future reference. If you don't get a favorable report and refuse him credit you then know you are safe and have not misjudged this new customer.

There will be a good many smiths who do not feel like paying to have 500 of these applications printed, as they would not probably use that number in a long time, so why not have the Editor print some and have them for sale in lots of 100. I would

APPLICATION FOR CREDIT.

Date..........................I hereby make application for credit with ....to the extent of $......... per ....and as reference will furnish the following three business firms:

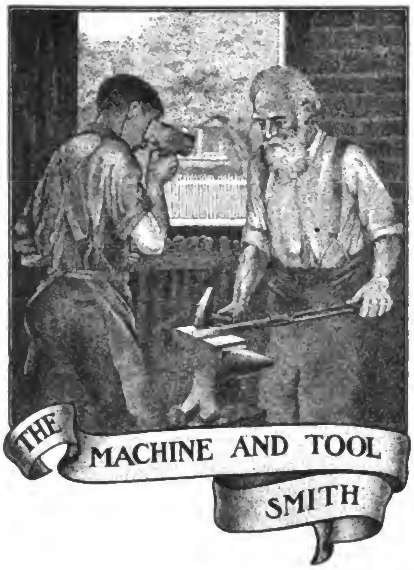
Name	Business	Address	Phone
....	....	....	....
....	....	....	....
....	....	....	....

And if I receive credit on above application I agree to pay in full at the end of each..................................Name..................
Business..............................Address..............................
Phone .... No. horses .... Wagons ....
I have been getting my work done at...
Address ....Phone ....

A SUGGESTED FORM FOR CREDIT APPLICATION SLIPS

like to hear from the Editor as well as many others on this plan. I have made out a sample form.

EDITOR'S NOTE.—We should like to have a thorough discussion of this matter and open our columns to readers with something to say. Perhaps some reader is now using a form of this kind. If so, why not give your experience of how the idea works. In the May issue Mr. Manville described a simple system of credit for smith shops which appears to work very well. This is an important subject to all shop-owners and one that deserves a most thorough discussion, and as usual we open our columns to letters on the matter. It is unnecessary to say that should there be sufficient demand for the credit applications as suggested by Mr. Ferree, we shall be only too glad to supply them at cost, of course.



Frame Making and Repairing

JAMES BEATTIE

We must all admit that new conditions are almost daily springing up, and one of the conditions that confronts the blacksmith and foreman at the present day is that locomotives which a few years ago were rated for a certain hauling tonnage are now called upon to haul an increased tonnage of from 15 to 40%. Consequently, the steam pressure has to be increased, and among the first members of the machine to be affected are the frames, especially on locomotives that have been in service ten to fifteen years.

As we do not have a surplus of motive power we know that when an engine comes in with a broken frame the power is decreased to the extent of one engine. Therefore, if it is at all possible, repairs must be made on the frames without removal, in order that the engine be gotten into service quickly. The roundhouse foreman sends in a slip that reads like this, viz.: "Eng. No.——— has broken frame. What can be done?" Then, in my judgment, if repairs can be made without removal the next query is: "Can we have the engine for train No.———?" Our plan of procedure is this: the machinist drops one pair of wheels and loosens the frame where necessary, so it may be opened at least one inch, whether the backbone, the lower brace or the leg. If in the backbone we place two bars of 3 by 6 across the frames wherever we can get a good butt, extending outside for a sufficient distance that the tie rods of 1¾ round iron may be clear of heat. We insert a piece of good iron 1 inch thick with grain in the right direction, and projecting at least one and one fourth inches all around the frame. Then we fit brick work, leaving as large a space as possible, so the heat may taper off gradually, otherwise, if the brick is too close, the frame will waste at the edge of the brick. We have two small portable furnaces on wheels. One is placed on straight track outside of engine, the other on the inside to run sideways on an inclined track to bottom of pit. We place these furnaces close to the brick work that has been fitted around the frame. We place a twenty-gallon tank on the running board to supply the fuel, which is crude oil, and after all preparations are made the frame is welded in from forty-five to fifty minutes. If the time extends over sixty minutes the frame is wasting, but with the furnaces we have for vaporizing the crude oil and a clean, brilliant flame playing on the frame the projecting metal will be down the slag opening in due time. We then tighten tie rods until the frame goes back to tram marks, and remove furnaces, when the frame will show an increased area as far as heated and without any waste whatever.

If the break should occur in the leg, the opening up will produce a curvature in the lower brace and will throw the leg out of line. This can be easily remedied by applying a jack between jaws, immediately after welding.

I am not a believer in butt welding under ordinary conditions, or in shop practice, but I believe that it is the best weld possible on a frame without removal. We have excellent success welding on the above plan, but I ascribe our success in some measure to the relieving of a probable strain that may have been in the frame. We are giving engines a general overhaul without taking the frames down that have been welded on the engine. We have become so accustomed to the above plan of welding that we adhere to it, and have all the necessary appliances ready, therefore it is economical.

There is no telling where a break may occur in a frame, and the ingenuity of the blacksmith foreman is brought into requisition quickly.

J. W. RILEY

I am of the opinion that the best results are obtained by welding the V in with sledges on the anvil when repairing broken frames, and as soon as the V is set down use a fuller to cut the V off, doing it before the heat is gone, and the edges of the frame will be welded by the use of the fuller.

The best results are obtained by using good hammered iron for the V, and be sure the grain is with the parts to be welded. A great many blacksmiths think the V should be as hot as possible. This makes a good looking job, but the life is often burnt out of the iron and there is no strength to a weld of this kind.

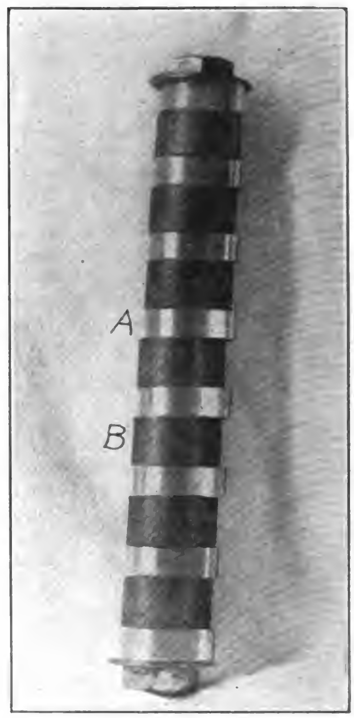


FIG. 1.—CAMS READY FOR HEATING

Very often a blacksmith foreman is called upon for his advice in patching a frame. I have a patch which I have applied a number of times in the past three years without a failure. Of course, this kind of a patch cannot be applied in all places, but where it can it is all right and can be applied without removing the wheels. And in case of a rush the job can be done in about eight hours, as the pins

and plates can be forged and plates drilled on one end while holes are being drilled in frame. To apply this clamp, drill holes for pins as large as frame will stand (about $1\frac{3}{4}$ to $2\frac{1}{4}$ inches), using tool steel pins of low carbon, and temper in oil, but do not have them too hard. Make the pins to drive in with a five-pound hammer and make them come flush with outsides of plates. If the broken parts have no anchor, drill a $\frac{3}{4}$-inch hole for dowel. If the broken parts are not separated, allow $\frac{3}{32}$ inch for shrinkage, and measure both sides of frame, as the holes may not be drilled straight. Drill holes in both ends of the plates to suit pins, and slot the hole on inside on one end about $\frac{3}{16}$ inch. Have holes tapped out in each plate for $\frac{3}{4}$-inch tap bolt to hold stirrup made of 2 by $\frac{3}{8}$ inch. In case a pin should break it would hold plate in place.

How to Handle Cams in the Hardening and Grinding Departments

J. F. SALLOWS

This article refers to keyed or pinned cams. Some key and pin their cams while others only key them; then again, some pin them and do not key them. But this matters very little, as a great many are having a lot of trouble trying to produce a glass-hard cam after grinding, and the only place they seem to look for trouble is in the hardening department. Now, if there is one place more than another where the trouble is caused, it is in the drop forge shop. Here they seem to care nothing for the trouble caused the hardener, as the drop forger knows very little about the art of casehardening. This is why they are so apt to make cams from any old piece of scrap that is large enough; it matters not if it is cold-rolled, screw stock, tool-steel or high-speed steel. In fact, they would make them from cast iron if it would stand the hammering. The writer has seen cams made from all grades of steel junk, and also seen the trouble it caused in the hardening department. Steel for cams should not drift very far from the following: 15 point carbon open-hearth; sulphur,

FIG. 2

FIG. 3

0.5 per cent; phosphorus, 0.5 per cent; manganese, 0.5 per cent.

The above will caseharden very nicely, but when they run wild in composition as stated there is bound to be trouble. Another cause for trouble is piece work in the machine shop; this causes a lot of poor work in the way of milling, drilling, keywaying and the locating of cams on the shaft. I have seen cams that were milled so far off and keywayed away off and drilled away off that, when hardened and pinned on shaft for grinding, the nose of some cams was around where the heel should be. And the fun of it all was that the fellows in charge tried to grind them into line. If the case had been one-eighth inch thick, it would have been ground off on some parts of the cams while other parts of cam would be only slightly touched. Sometimes the fixtures for machining cams are a little out and, if the operator is in a hurry to make a good day's pay, he takes little care in placing cams in the fixture properly. If a firm wants to produce a good grade of work for its customers and is sincere in the matter they should have day work, pay fair wages and employ first class help as well as competent foremen. This would do away with the fellow in the lathe department having too much stock for grinding, and do away with the fellow in the grinding department trying to get out two days' work in one. Piece work is all right in some places, say for instance in a gravel pit; but it is out of place in a machine and grinding department when a good class of work is desired. Running at too high a speed is bad for ground parts, and very few know what grade of wheel to use, or they think it makes no difference what the wheel is like, as long as they hog off the stock and pile up a bunch of parts that next day have to be trucked out to the scrap pile. For a Norton Grinder, we should use a 24 J wheel; and for a Landis Grinder, a 46 K wheel, and a little common sense with both in regard to speed and feed.

Now, we want to call your attention to Fig. 1, a photo of eight cams on a bolt with pieces of tubing in between cams; 'A' is cam, 'B' is tubing. The hub of the cam fits into the tubing. The bolt should be one eighth inch smaller than the hole in the cam. Fire clay is pressed down between cam and bolt. First, put washer next to head of bolt, then a coating of fire clay, then a cam, then a piece of tubing, then roll some fire clay between the hands and wind around bolt just above tubing and pack down around bolt. Then put on another cam and another piece of tubing, and so on until bolt is full. Then put on another washer and a nut, catch the head of the bolt in the vise and with a large wrench tighten nut. This will send fire clay where it belongs, and you can then remove nut and washer and put on another cam, just leaving room for washer and nut. After tightening nut firmly clean off all fire clay from outside, and the job is ready to pack. Be

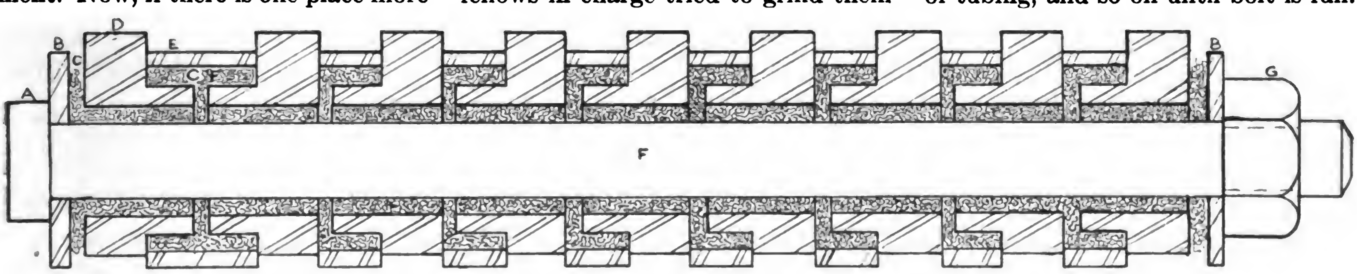


FIG. 4—SECTIONAL VIEW OF CAMS ARRANGED ON BOLT READY FOR HEATING

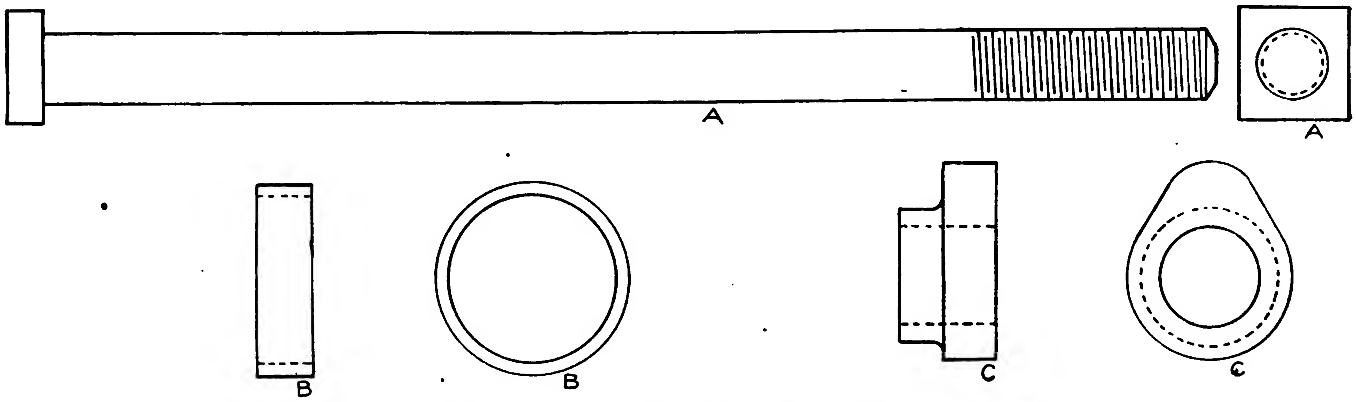
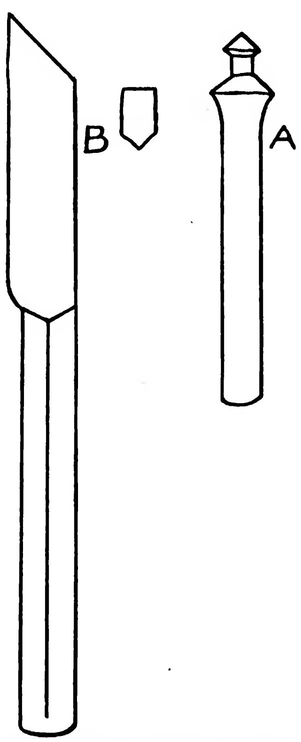


FIG. 5—SHOWING BOLT, WASHER AND CAM BEFORE ASSEMBLING

sure and have plenty of space between the bolts of cams in the boxes. About 50 of these cams can be put in a Brown & Sharpe furnace at one time. A splendid carbonizing agent to use or this job is No. 1 Blaich Modern Carbonizer. It is fine, and packs down well between nose of cams A splendid idea is to put a test piece in the front box; then, after your work has been in the furnace for the required time, you can take this from the box, quench it, reheat it in the forge and break it to show just what has been doing. If the case



TWO HANDY REPAIR TOOLS

is not deep enough, leave work in a little longer. At Fig. 2 is a piece of $\frac{1}{4}$ by 1 inch fifteen carbon open-hearth steel, put in for a test piece. It shows a nice fine case about $\frac{1}{16}$ inch thick. The cam in Fig. 3 was done on a bolt as described. It has a glass-hard case on the business part only; the hub and inside of the cam is soft and tough; and it required five heavy blows with a 12-lb. sledge to disfigure it as much as shown.

In Fig. 4 we give you an assembled view in sectional form of how the cams are arranged on the bolt. 'A' represents bolt head, 'B' washers, 'C' fire clay, 'D' cam, 'E' tubing, 'F' bolt, 'G' nut. In Fig. 5 we give you a side and end view of bolt A A. An edge and face view of tubing B B. Also two views of cam C C. Now, I believe anyone who is having trouble with keyed cams will come out of it if they do as described in this article.

In our next article we will take up the solid cam shaft, and show where a whole lot of trouble can be avoided.

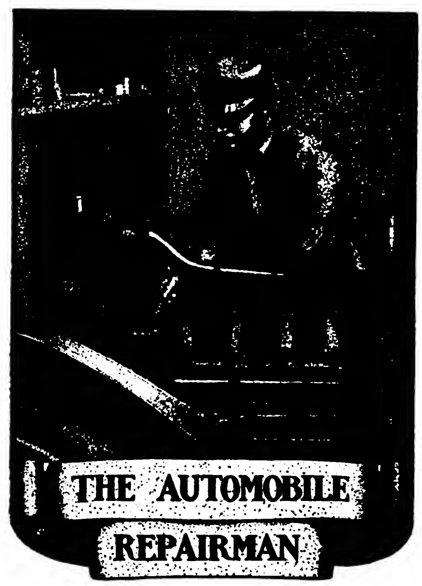
The Repair Shop

DAYTON O. SHAW

Almost every repair job requires a special tool or some new arrangement for holding the work. Consequently, one is kept busy with his head as well as with his hands. In drilling cast iron, if a flat drill is used have the lips of the drill the same length. If one side is longer than the other it will cut a larger hole. If you have a hole that is not quite round, and you want to make it so, dull one side of your drill and cut with one lip only.

A combination drill and countersink is a handy tool—see A in the engraving. This can be made any size or length. The drill should be long enough to break through the work before the countersink begins to cut.

Another handy tool is the V-chisel —see B in the engraving. Take $\frac{1}{2}$-inch octagon steel; flatten two inches of the end down to $\frac{1}{2}$ inch on top, and $\frac{3}{16}$ inch on bottom. Cut the end off at an angle of 45 degrees. After annealing, commence at the point and file a V back far enough to give a good clearance and temper. This tool can be used for many things, but especially for cutting wrought iron pipe, where you cannot get at it with saw or pipe cutter. If you once have these tools in your kit you will never want to be without them.



Adjusting, Repairing and Caring for the Automobile—5

With Special Reference to the Packard Car

WATER CIRCULATION

Keep the radiator filled with clean water which is as free from lime and other impurities as possible. As the water, in its circulation, discharges from the motor into the top tank of the radiator, any steam or surplus water will escape through a vent pipe, extending from beneath the filler cap downward to the lower corner of the radiator on the left side. Avoid pouring cold water into an empty or nearly empty water system when the motor is excessively hot as

may be the result of having run it dry. A pulsating action of the governor is probable indication that the radiator is not full.

The water pump is of the centrifugal type. It is attached to the right side of the motor base, below the governor, and is direct driven from the gear compartment. It draws water from the bottom tank of the radiator, forcing it through the governor and thence into the cylinder water jackets. After circulating around the cylinder walls the water is forced through the tops of the cylinder jackets into the top tank of the radiator. The water passes from the top to the bottom tank through the narrow spaces between the small square tubes which compose the radiator. A belt-driven fan, behind the radiator, draws a current of air through the radiator to increase the cooling efficiency. The fan bearing bracket is provided with a vertical adjustment to regulate the belt tension.

To thoroughly drain the water from the entire system it is necessary to open the water system drain cock in the inlet strainer at the base of the pump, the governor water chamber vent cock and the water pump drain

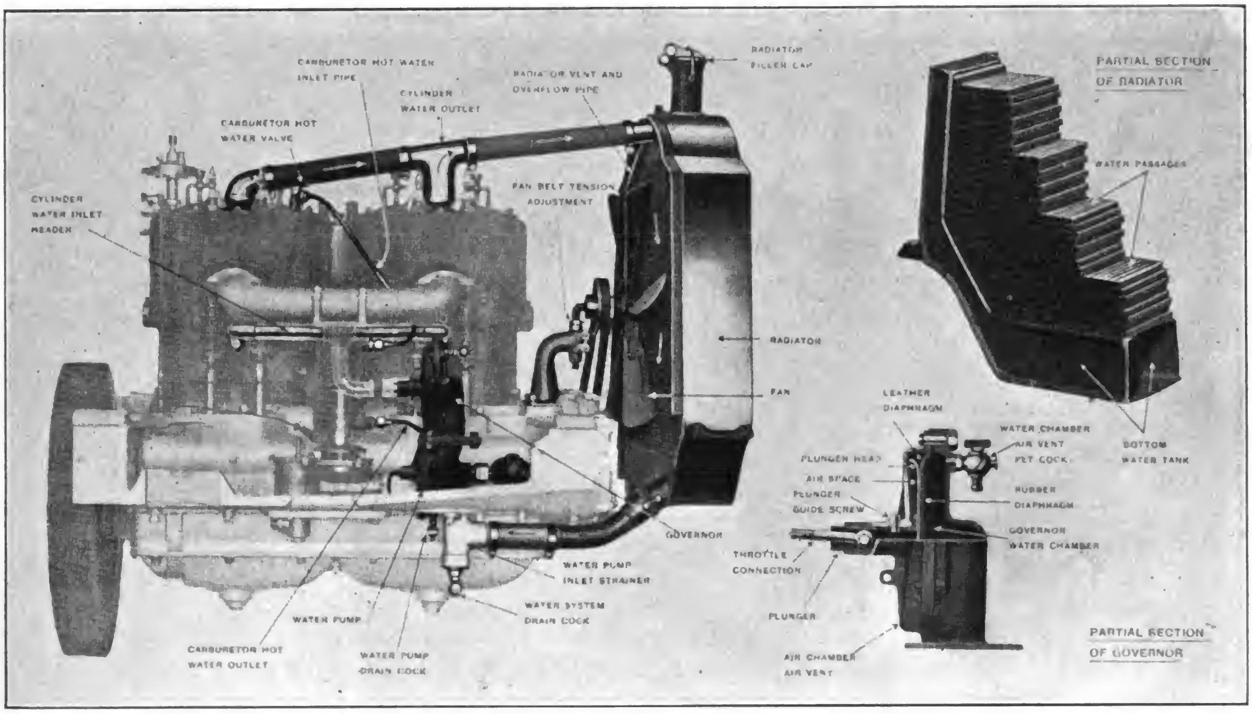


FIG. 1.—WATER CIRCULATION SYSTEM AND DETAIL OF RADIATOR AND OF THE GOVERNOR

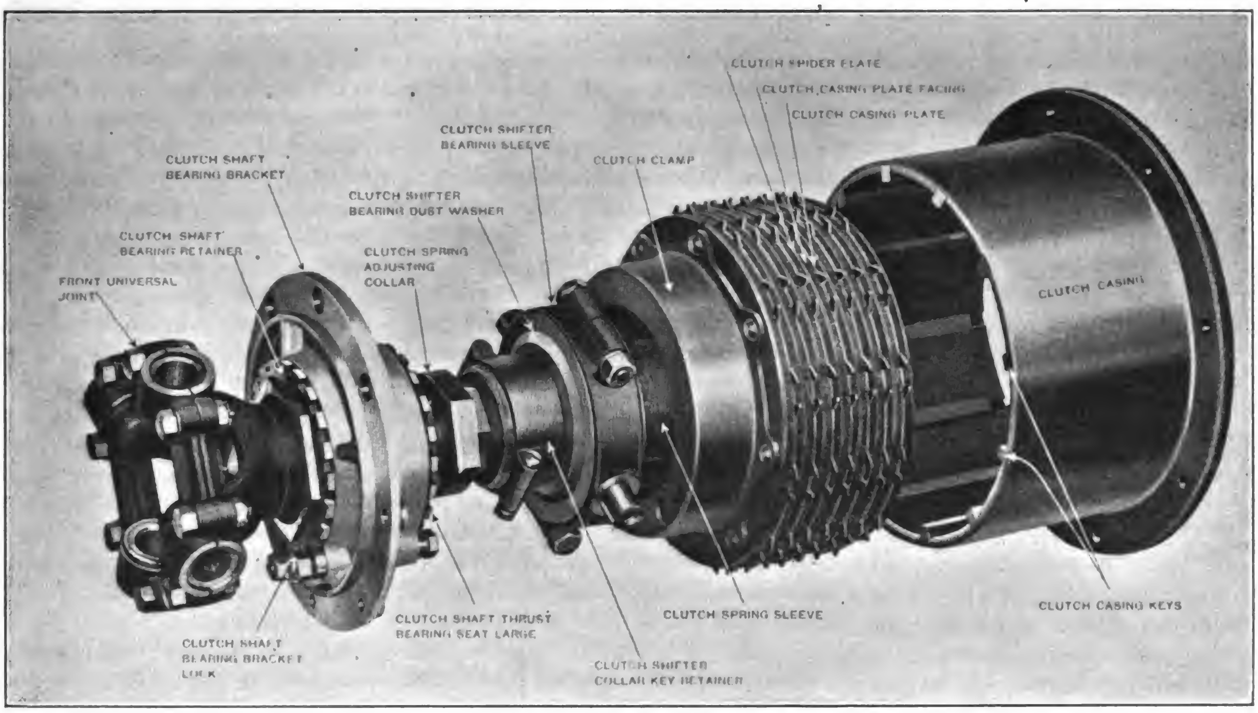


FIG. 2.—DRY PLATE CLUTCH, WITH UNIVERSAL JOINT AND OTHER PARTS

cock. When the cocks are opened, also open the filler cap on the radiator to permit a complete circulation of air. When the water has ceased to flow from the three pet cocks, run the motor slowly for about a minute.

The dry plate clutch operates without lubrication of any kind, engages gradually, and works as well in cold weather as in warm weather. The clutch consists of two series of plates which are alternately connected with a casing attached to the fly wheel and with the clutch shaft. Those which revolve with the fly wheel are faced with a special friction material that obviates lubrication and will not burn. These facings come into contact with the steel spider plates connected with the clutch shaft. A strong coil spring holds all the plates together when the clutch is engaged. The clutch is disengaged by forward pressure on the left pedal.

The clutch itself needs no lubrication or any other ordinary care. Oil the clutch shifter bearing as described previously. No change from the original adjustment of the clutch is needed, as the clutch surfaces are automatic in their compensation for wear, and the clutch spring should need no adjustment. The clutch pedal should line up with the brake pedal.

The three forward speeds are obtained by a compound pinion, which slides on the main driving shaft. It engages countershaft gears for the first and second speeds, an internal gear clutch for third speed or direct drive, and an idler gear for reverse drive. The plan view of the transmission gear (Fig. 4) shows the compound sliding pinion in neutral position, no gears being engaged for driving the car. Sliding the compound pinion forward until the first speed pinion engages the first speed gear on the countershaft drives the car forward on first speed, or at the lowest transmission gear ratio. Sliding the compound pinion from neutral position backward until the second speed pinion engages the second speed gear drives the car forward on second speed, or at the intermediate transmission gear ratio. Sliding the compound pinion still further backward until it engages internal teeth in the direct drive gear locks the two sections of the driving shaft together and obtains the third speed forward, or highest transmission gear ratio, by direct drive. Reverse drive is obtained by the action of the reverse toggle when the compound sliding pinion is in neutral position. Movement of this toggle brings into engagement with the first speed pinion and the first speed gear a broad faced idler gear, which normally is out of engagement, being carried by a swinging yoke below the other gears.

The three forward speeds and reverse are obtained by different movements of one change speed or gear-shifting hand lever. The actual operation of making gear changes has

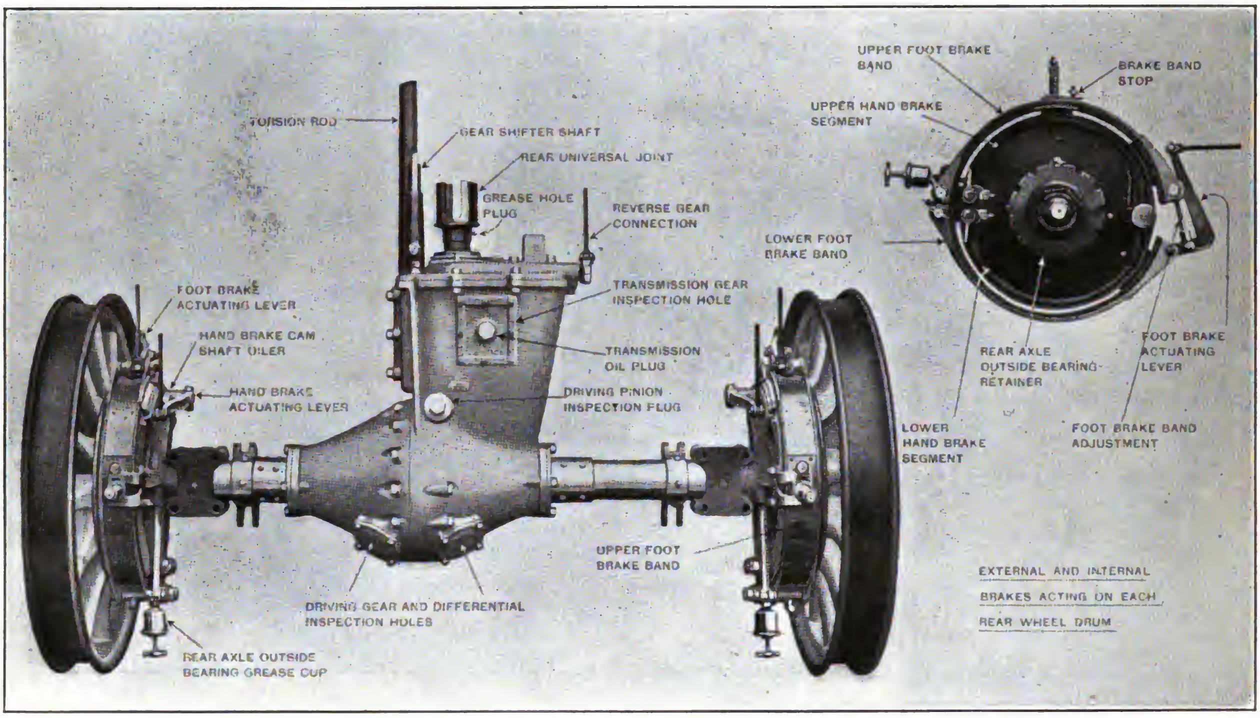


FIG. 3.—THE TRANSMISSION, DIFFERENTIAL AND REAR AXLE UNIT AND DETAIL OF BRAKE

The radiator and the cylinder water jackets occasionaly should be cleaned. To clean the radiator, remove the hose connections and flush out by forcing water under city pressure through it, from the bottom to the top. Avoid excessive pressure. Flush the cylinder jackets in a similar manner, but let the water in at the top and disconnect the hose between the cylinders and governor so that the water may flow out onto the ground without reaching the governor. About once a month remove and clean the water pump inlet strainer. This may be done without disturbing any water connections.

The Transmission

Back of the fly wheel is a clutch by means of which the motor may be connected with or disconnected from the transmitting element. From this clutch the power is transmitted by a universally jointed propeller shaft to a rigid unit on the rear axle. This unit combines a three-speed forward and reverse speed-changing gear set; final drive bevel gears and a differential, compensating for the unequal travel of the road wheels when the car is turning.

already been described. The positions of the lever to obtain the various speeds are shown in the gear shifting diagram (Fig. 4). In neutral position, with no gears engaged, the hand lever is opposite the notch on the inner face of the quadrant. In first speed position the hand lever is at the back of the quadrant slot. In second speed position the hand lever is ahead of the notch in the side of the quadrant and between the two small positioning stops. These stops assist in bringing the hand lever accurately into second speed position from either direction. In third speed, or direct drive position, the hand lever is at the forward end of the quadrant slot. For reverse drive the hand lever is brought into neutral position and then carried laterally into the notch on the inner face of the quadrant. There is on the quadrant a reverse guard which should be snapped into position when the car is left standing with the motor running. This prevents the hand lever from being accidentally moved into the reverse drive position.

Always fully disengage the clutch before attempting to make any gear change. Do not shift gears forward too hurriedly, but do not delay the actual operation, after the clutch has been disengaged, so that the speed of the car will greatly decrease. Experience will determine the desirable speed to acquire on one gear before changing into the next higher gear. This, of course, varies according to road conditions and the load. When changing from a higher to a lower speed make the shift quickly and do not allow the speed of the motor to decrease.

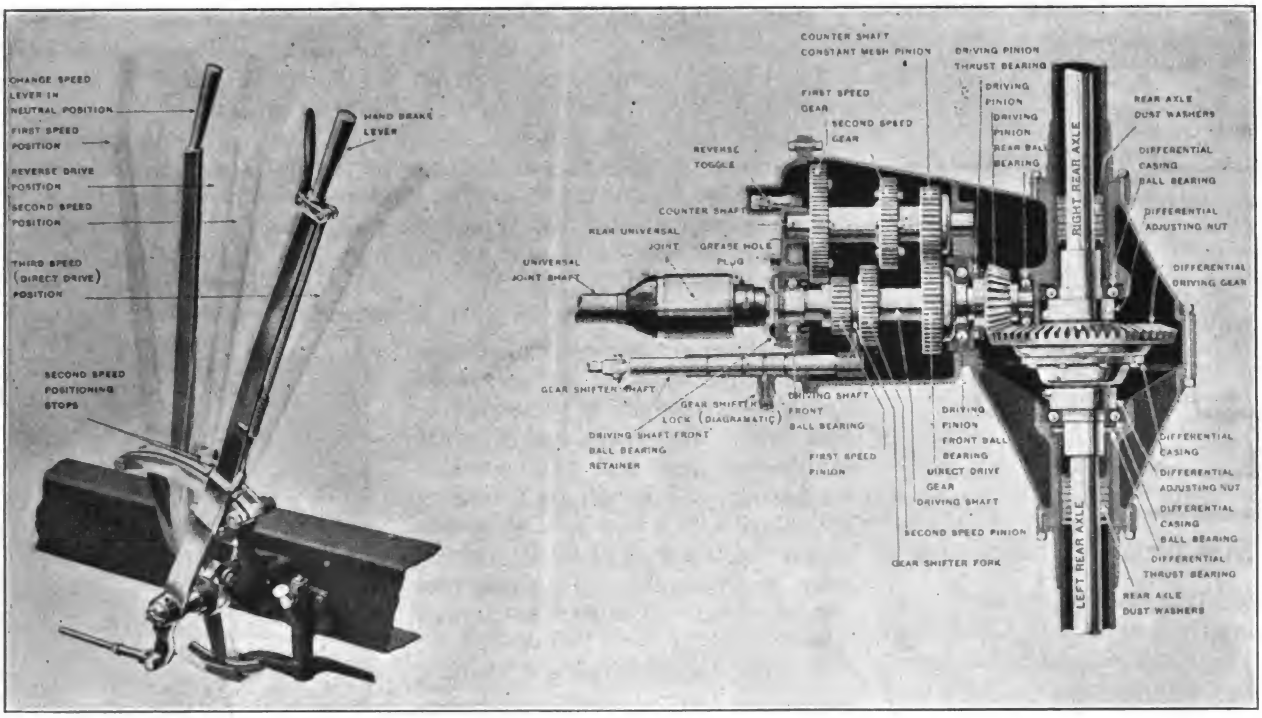


FIG. 4.—MOVEMENTS OF THE CHANGE SPEED LEVER AND SECTIONAL PLAN VIEW OF THE TRANSMISSION

The gear shifter shaft is provided with locks which determine the correct engagement of the gears for any forward speed. These locks are spring controlled plungers, which drop into annular grooves on the gear shifter shaft. In making a gear change, the operator may readily tell when the gears are correctly engaged by the check occurring when these plungers drop into the grooves. There should be little or no noise in making speed changes. The hand brake should be applied when the car is left standing. This is imperative if the car is left on a grade. After the car has been reversed bring the change speed hand lever into neutral position regardless of whether the car is to be immediately driven ahead or left standing.

The Valves of the Gasoline Engine

J. N. Bagley

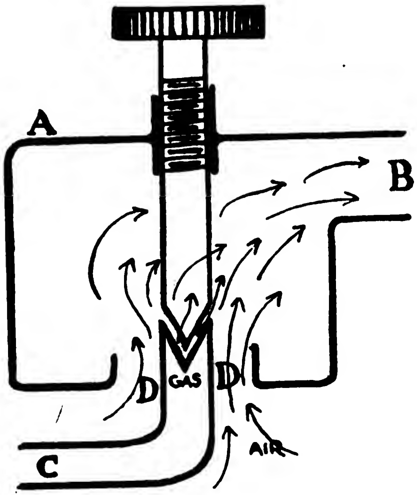
The four-cycle engine has two valves, the admission or intake valve and the exhaust valve. The object of the intake valve is to permit of a charge of air and gasoline being taken to the combustion chamber of the motor. This valve may be either automatically or mechanically operated. The latter seems to have the preference, as it allows of a more uniform mixture to be taken to the combustion chamber at a wider range of speeds. The exaust valve is always operated by a cam driven by a two to one gear driven by the crankshaft. These valves are located at a point on the cylinder head, so that their ports, or openings, open in, or lead directly to the combustion chamber of the motor.

These valves are usually of the mushroom type, and operated as already stated by the two to one valve cam and suitable push rods in connection with these cams. The manner of operating the valves is by means of the slide rod on the engine of the horizontal type, and with the gear and push rod on the vertical type of engine. One of the most practical reasons for this distinction is it is more desirable to have the valve stem work in a horizontal position than a vertical position. It has been stated by good, practical men, who have made it a study, that a valve working in a vertical position has the advantage of coming down straight and square to its seat, and the wear

on the valve and stem is likely to be uniform at all points of friction.

Valve Chambers

The valve chambers may be cast separately and bolted to the combustion chamber of the motor, or they may be cast in one piece. However,



SECTION OF SIMPLE CARBURETOR

the bolted chamber has the advantage of being replaced in case it is broken or worn without the expense of a new cylinder. Many times the valve seat gives way to the heat and becomes useless. On the other hand the chamber being cast to the cylinder does away with the trouble of packing. The valve pallet and the seat are usually placed in such position that they can be gotten at readily in case they need to be reground or cleaned.

Valve Stems

The valve stems should not be oiled, as they are subject to a great amount of heat, and the oil would soon carbonize, thus affecting the movement of the valve in the guide. On starting the engine this one point should never be forgotten, especially on a new engine. In case the valves are stuck in their guides a little kerosene will relieve the trouble. The valve stem should be the proper distance from the lift to give the required power. For example—if, after regrinding the valve, the valve stem came down against the lift, the engine would start as usual, but after a little time the valve would become hot and the expansion of the heated metal would not allow the valve to seat properly, and the engine would go skipping and popping with a loss of power. I have known of cases where new coils, new plugs and timer have been put in to remedy the missfiring, but without results and which were not forthcoming until the valve stem was shortened a trifle. The space between the valve stem and the valve lift should not be less than $\frac{3}{32}$ of an inch. Having the distance between the valve stem and the valve lift exactly correct is just as essential to good results as having the mixture correct.

If, while the motor is running and everything seems to be at its best and work well, with the exception of a missfire or after fire, explosions in the muffler, etc., look to the following; coil adjustment, sooty spark plug, a loose wire or a sticking or warped valve stem.

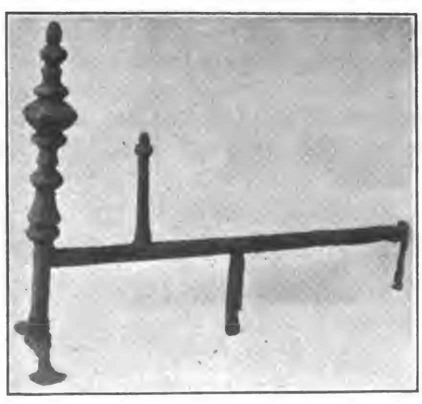
Valve Springs

Both valves intake and exhaust are held to their seats by springs; these springs are generally of the compression type. The valve spring, when in constant use, will at times lose its tension, and it will be necessary to replace with a new one, or in case a new one is not at hand the old one may be taken from the guide and stretched until it shows the required tension.

In case valve springs are required to replace the old ones they should be purchased from the makers of the engine, as the springs from some other engine might look the same and still be enough different to affect the running of the engine. The valve springs should be kept free from lubrication.

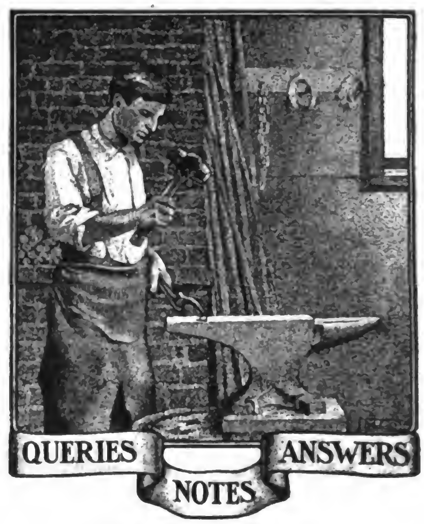
Needle Valves

Some people have an idea that the gasoline flows directly into the cylinder. The accompanying engraving will enlighten these folks. The body of the valve is represented by A. Now, if we leave an opening at the bottom of A and place the point of a small pipe up into this case, leaving a little space around it for the air to be drawn in around the gasoline pipe,



A FIREDOG OF THE 16TH CENTURY

we get a quantity of gas with the air as it is drawn through the opening D. Now, if we place a needle valve E in the opening of the gasoline pipe, we can regulate the amount of fuel that can be drawn to the chamber of the motor. One of the first things for the operator of the engine to do is to familiarize himself with workings of the gasoline valve. It requires only a little time to become thoroughly acquainted with. And the regulation of the fuel is one of the greatest secrets of power that we have to deal with. The carburetor differs little from the mixing valve; the gas instead of being regulated by the needle valve is regulated by a float.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

Wants a Handshaper.—Will you please publish in your paper how to make a handshaper for light work with a four to five-inch stroke? R. W. Lawson, New York.

For Cuts in Horses' Feet.—I would like our readers to know that strong washing soda water is one of the best cures for badly mortified cuts in horses.

William Lobb, Victoria, Australia.

A Question on Forge Measurements.—I should like to ask a question through Our Valuable Journal—a very important item in our trade: What is the exact measurement from the extreme top level of your forge hearth down to the center of the hole in the tuyere iron? What is the reason for the tuyere being so placed?

Peter Peterson, Scotland.

A Circular Saw Query.—Who can tell me how to hammer a 60-inch circular saw? We have one that has been running for five or six years without hammering. It has been gummed about six times, and, while it runs well, it seems to be loose in the rim. O. T. Jones, Mississippi.

Work for the Band Saw.—In reply to Mr. C. W. Fluent of Maine regarding a 20-inch band saw for sawing 3-inch stock, I wish to say that I have a 20-inch saw and

can saw 5 and 6-inch hard timber with ease. I use a ⅜-inch saw with fine teeth.

S. W. ELLIS, New York.

Shoeing the Horse.—The March number of Our Journal is excellent, with one exception, viz., "Shoeing the Horse," by P. Y. Miller. If Mr. Miller shoes anything like the illustration I think he would never pass the rigid examination that he proposes. On the opposite page the article by E. J. Maloon is the most sensible article that I ever had the pleasure of reading.

A. R. HALLENBECK, New York.

Wants to Restore the Temper.—Would some of the Brothers with more experience than I have give me a little information. A few days ago a party brought three Stilson pipe tongs to my shop to be hardened. They went through a small fire. Can they be brought back so they will be of any use again? They are quite soft now.

J. F. V. K., North Dakota.

On Brazing and Shoeing.—I have installed a Goodrich rubber tire machine, but I do not understand the brazing. I scorch the rim of the wheel, and would be glad for some Brother to give some pointers on this line. I also have a horse that is lame in the front. His feet are bloodshot at the toes on the bottom of the foot. I never saw one as bad as he is. I am sure that he has been foundered at one time, but cannot find anyone that ever knew of it.

J. D. FERRELL, Florida.

Measurements of Wood Stock.—I notice in the January number that Chas. F. Rahn wants information on measuring wood stock. In ordering rims you give width of tread, then depth of rim and diameter of wheel. In ordering spokes you give merely width of spoke where it goes in the hub, and for poles give the size at the largest place. For instance, a buggy pole, give size at doubletree measure, the small way first and for wagon the same.

W. B. SANDERS, Tennessee.

A Handy Anvil Tool.—About as handy a tool as I ever saw is shown in the accompanying engraving. The uses to which this tool can be put are innumerable, and the bench vise need not be used at all for hot work. We have two in our shop and they are in use every day. I think the engraving is simple enough to need no explanation.

P. LAMBERT, New York.

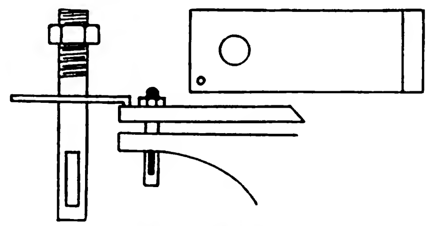
Wagon Designs and Tire Setting.—I have been reading your paper for some time and I find it very useful in many ways. I have not a very large business; two fires going, and I do mostly shoeing and wagon building. I would like to see some pattern of farm wagons such as are most used in America. It would acquaint the country smiths here with the most up-to-date ideas in the building line. Could some brother craftsman tell me the degree of tightness required on new wheels 3½ and 4-inch tires? I give them 1¼—is this enough or too much? JOHN H. TUCKER, Victoria.

How to Make Sand Belts.—Replying to the query of C. B. Staples, sand belts are made of No. 8 white duck sewed double. The glass had better be obtained from a sandpaper maker, and is to be had in various numbers, the same as sandpaper. It is sprinkled thickly on the best grade of glue (not fish glue) while the glue is hot. Best results are obtained by warming the glass. The belt is put on the pulleys, the glue and glass applied, and as the belt rolls over the pulleys the surplus sand drops off. D. SYLVESTER, New York.

Repairing Cracks in the Cylinder.—In the March issue someone asks how to repair a cracked cylinder head on a gasoline engine. I will tell how I repaired water jackets and I think it will do for the head.

Take iron filings and salammoniac and make a paste of them. Fill the crack with it and take a blunt chisel-like tool and calk it well. Now scrape the groove bright which you will get by calking and run your engine without water till it gets warm. Then take a soldering iron and solder the crack over smoothly. If you paint it over after this is finished, no one will see the crack.

JOHN F. KOENIG, Missouri.



A HANDY ANVIL TOOL

The Right Spirit.—I think that if my brother blacksmiths would work more to the interests of each other, and would try to build up their trade, instead of pulling it down and cutting prices all to pieces, they would get along better and have more work. We have a good trade almost all of the time, and we are here to do the work when it comes. We have one of the best shops in the country and take pride in keeping it up in good shape. We possess a gas engine, and are putting in more machinery as fast as we can.

H. M. HUGHES, Iowa.

Wants to make Plow Shares.—I have bought a business here and am doing very nicely. I have built a new house and bought my shop and lot. I would not like to be without THE AMERICAN BLACKSMITH. I also take a Canadian journal. It is very nice, but not in it with THE AMERICAN BLACKSMITH.

I like to read the letters from our brothers in the craft and would be very glad if some of them would give me the best way of making a plow share. The share work is all new to me and I get along all right with everything but the making of a new share.

A FRIEND, Saskatchewan.

Wants Suggestions.—We are in the center of a large country district and have started undertaking as a side line. Up to the present a Cortland wagon has done the duty of a hearse, but we have now built a regular hearse and want to use it. People here (country people, especially) are old-fashioned, and we find it hard to get them to break away from old customs. We want suggestions as to the best way to advertise that we do undertaking and have a hearse. Will some of our American fellow-tradesmen give us suggestions? We feel they will and thank them in anticipation.

COOPER & CURD, New Zealand.

Two Useful Hints.—To temper an axe, first dress your axe but do not grind it entirely to an edge. Take a cherry heat on it, take out and cover blade all over on one side with borax. Take the second heat (a bright heat) and dip in rain water, leaving sufficient heat in it to draw to a pale blue. Cool in clear water. Don't have the bath too cold, luke warm is best at first. Cut off the scales with file, then grind.

I find that a good way to remedy a weld when one scarf is stuck solid and the other is open and a little short of material is to take a few drill shavings and lay them on top at the end of the scarf. Take a good clean heat and hammer lightly but quickly and you have a good weld.

J. F. RUDD, West Virginia.

About Band Saws.—In the April issue C. W. Fluent asks if a 20-inch band saw is large enough for working 3-inch oak. I have never used a 20-inch saw, but have talked to two other smiths who had 20-inch saws and they said they were not heavy enough for general shop use. The frame is light and vibrates too much under the heavy strain when sawing 3 or 4-inch oak. We have been using a 32-inch Crescent saw for several years, and find it entirely satisfactory for our work. We use three saws, ¼, ½ and 1¼-inch wide. With the ¼-inch saw we can cut a 2-inch circle. We use the ½-inch blade for sawing felloes, bolsters and standards. We use the 1¼-inch blade for ripping 4 to 8-inch oak.

P. V. BURGESS, Missouri.

A Question on Axle Setting.—I have seen quite a few remarks in THE AMERICAN BLACKSMITH regarding the set of a wagon axle, but I have not seen anything as to whether an axle with a large taper and another with a small taper, both set with the same set, will be the same. That is, will the wheels set the same after the axle is put in the wagon? Does a large taper require more set than a small taper? We will say the axle arms on a given axle are straight on the bottom, i. e., that the arms are in line one with the other. I have heard a number say there is no difference—put the arms to the same set and they would be just the same.

ASA FANCHER, Connecticut.

To Drill Through Anvil Face.—How can I drill a ½-inch hole through the face of my anvil without taking the temper out, when anvil is harder than the drill bit? Is there any solution to use on spot that will soften and not injure balance of face?

S. G. GUINN, Pennsylvania.

In Reply.—Why not try a method that works on chilled mould boards and other extremely hard stock? Of course, it is somewhat difficult to place the anvil in the fire, so I would suggest using a brazing torch upon the spot to be drilled. A torch such as used in railroad shops would be just the thing. When the face is a good red, place a piece of brimstone on the exact spot to be drilled and allow it to melt. When cool drill in usual manner.

F. H. G., Massachusetts.

To Cure the Toe Dragger.—In answer to Mr. T. W. Fowler, in regard to the horse that drags his toes behind, I would say to shoe him with a shoe having a piece of rasp welded across the front. If the horse stands in a correct position—I mean if the foot axis is not broken forward or backward,—shoe him with a flat shoe, not using heel calks. Should the pasterns be out of line they can be corrected by either paring hoof or applying heel calks. To make this shoe, take

an old rasp, weld across the front toe of the shoe, and cut to length, according to requirements of each case. This projecting toe calk should be tried till the horse no longer strikes and wears away the hind hoof at toe by interference with the opposite front shoe. The heel calks are used if heels need raising up. C. CRAIG, Ontario.

A Letter from New Hampshire.—I am a reader of THE AMERICAN BLACKSMITH and enjoy it very much. I came to America nine years ago and have worked at the business most of the time. I worked six years in my old country, Sweden, where I learned the trade. I am located in a country village in the State of New Hampshire and have a good business here. I do horseshoeing and general blacksmithing. I like power very much and should not know how to get along without it. I have an Olds gas engine, an iron lathe, a drill press, a bolt cutter, an emery grinder, a power blower, and a power hammer which I made myself. I do some die forging and would like to hear from the brother blacksmiths who have had more experience in that line of work.

C. F. CARLSON, New Hampshire.

About Gun Springs.—In reply to Brother Claude Monti, Mississippi, I suppose he means hardening gun triggers, for that is the proper way to treat them, I use a casehardening compound. There are lots of good ones, though the easiest one to think of is Cyanide of Potassium. Heat your work to a cherry red and allow the cyanide to melt on the work. Then plunge it into cold water. I use this same treatment for all the work I want to caseharden and I get good results.

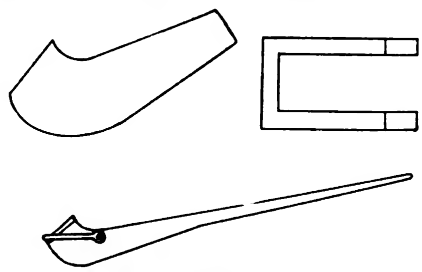
Here is my way for tempering gun springs. Heat your spring to a good even red and drop it in a ladle of linseed oil. Pour off all the oil, leaving just enough to cover the spring. Set the ladle on the fire and when all the oil is burned off the spring dump it out and let it cool. When cool put it in the gun and don't be afraid of its breaking, for if you used good stock and hammered the spring the right way it will not break. T. S. HOLLOWAY, Kansas.

How to Hold the Kicker.—I have been a reader of your craft journal for about three years (my boss takes it) and I think it a great help to me. I like to hear about those simple kinks, queries and answers. I don't doubt that fast shoeing, for I can make and put on 10 sets in one day or make 150 to 200 a day. I have only been at the game four years.

I would like to tell my brother smiths a good way to shoe the horse that kicks or lays on you. First get some one to hold him, or tie his head, so he can't go back. Take a piece of 1-inch or ½-inch rope, double his tail, put two half hitches around it, fetch the end through the loop caused by doubling his tail, then through a stout strap around his fetlock and finally through a ring on a post behind him. Draw the rope up till his foot is high enough to handle. He will soon get tired of having his tail hold up his foot. It is seldom necessary to practice this more than twice. I would like to hear somebody else's style of holding them. H. J. O., Australia.

A Handy Bolt Puller.—I have been reading THE AMERICAN BLACKSMITH; I find it useful quite often. I commenced to learn the trade in 1868 and up to the present time I learn something most every day, and when I have the time to spare I try some things no one else will. We have nothing to do here except farm work, mostly plow work or planter repairs and buggy and wagon repairs.

I have a little tool that is very useful to me. I never saw one like it. It pulls from the smallest nail up to and including $\frac{3}{8}$-inch bolts out of oak wood. I bent a 16-inch horse rasp in the middle, welded it and finished it like A. Then I made a clevis as shown—2½ inches from holes, drilled a $\frac{5}{16}$ hole in A, so clevis would not slip over the end. Then welded 28 inches of $\frac{7}{8}$ round stock on the piece A for lever, and it is complete. The one I have has been used for more than a year and is loaned out a part of the time. JOHN R. SHOOP, Oklahoma.



A HANDY BOLT PULLER

More About the Tire Heater.—In the April issue, page 175, I tried to describe the tire furnace which I have been using, but for the benefit of the readers will offer further information.

As to material, I used old brick for walls and a No. 16 blower for blast. I used the chains and gearing from an old binder to turn the rollers. There is no particular speed at which they should run.

The only expense of this furnace was the old brick which I had to buy and have laid up. The balance I made from scrap, and using a blower from an old Buffalo Forge, but gearing it pretty high. Tires are held upright by two pieces of 1½ by ½-inch iron dropped from top with bar riveted or bolted on low enough to catch all heights of tires. This heater will heat the heaviest tires made, but should be made to suit the work. The time required to heat tires with this fire depends on the blast and also on the amount of coal you use, but they can be heated very quickly, not longer than three or four minutes for a 3 by ½ tire with a good fire, and two tires in the fire at one time. M. ALBRIGHT, Indiana.

He Asks Several Questions.—I might say I like your paper very well, and would not like to be without it, but I think once a month is plenty, as it takes one all this time to get through it. I like reading "Around the Forge Fire," and I am sure we get some good articles both from Mr. Bert Hillyer and Mr. Metcalf. The first copy of THE AMERICAN BLACKSMITH which I saw was shown to me by a Mr. Ross while I was working for him in Canada, and I have never liked missing a copy since.

I would like to hear something of how to temper buggy springs both by oil and water and what kind of oil to use. I would also like to hear something of how to harden the jaw of a tire-welding machine. Would also like to see something on angle iron bending, such as the square corners with the flat on the outside. I would like to hear something on tempering the blades of an iron shearing machine.

I am sure nobody can say anything against the paper. I have shown it to a number of my blacksmith friends here and all have spoken well of it and have promised to be subscribers. I hope I shall see the above article answered soon.

AARON HUDSON, New South Wales, Aus.

A Letter From the "Auld Sod."—I like your paper very much; nothing could be better suited to my ideas. I do all sorts of general blacksmith work, but very little horseshoeing. I always kept up the prices for the work. I was glad to see this referred to in your paper. Plain smith work, such as horseshoeing, repairing plows, etc., has gone down in this country, but I make the plows myself. I also do coach-building, etc. I have a good lot of machinery used in connection with wood work, such as band-saw, circular saws, etc. I have no power as yet, but I intend to have it soon. I have also a tire shrinker which was made in your own city, Buffalo. I am advancing as best I can with the trade, but in a poor country like this it is not easy—not like your country. I have one of the best forge shops in Ireland. I keep it clean and whitewash it regularly and keep the doors and windows painted. I am glad to see you advocate this in your paper. The shop proper is thirty by nineteen feet, together with two sheds, thirty feet by twelve, and another shed in front, forty-two by twelve. I will send you a photograph of it later on. I forgot to mention I have a good open yard in front of the forges, and as much land as I like to build on, rent free. I have not worked steadily at the business for the last few years, as I have been building houses, etc., and my capital was going to pay masons, laborers, etc.

THOMAS O'HALLORAN, Ireland.

Has Difficulty Welding Axles.—I have been in the smithing line for nearly forty years, and have at times over fifty men working for me, so I should understand a little about the trade; but, of late, I have been quite unable to understand your American axles.

For a great many years I have been using axles branded as in the engraving (I presume double anchor), and while some of these axles make a perfect weld in a few minutes, others break off, time after time; and some which at the time seem to be a good weld will drop apart after being out of the shop two or three months. The sizes I am particularly referring to are 1½ inch and 1¼ inch. The great loss of time in welding and shutting pieces into make-up length is considerable in a large shop, and I wondered if there were any other complaints on the matter and if you could tell me the cause and remedy for it. If I butt-shut (butt-weld) them, I get a good heat; and put it in the shrinker and it looks to be well shut, but upon putting it across the anvil it will fall in two pieces, and if scarfed and welded acts just the same. I have good workmen and have watched them repeatedly on these axles and cannot make it out. I hope you or some of your readers will be able to throw some light on it. I enjoy your Journal very much and think every smith should be a subscriber.

D. DAVIES, South Australia.

Some Prices From West Virginia.—I have a nice country stand and do all kinds of work, though shoeing and general farm work principally. I can't see how a man can run a blacksmith shop without THE AMERICAN BLACKSMITH. I would like it better if I got it every week or twice a month at least. I will give you some of my prices:

Shoeing, New, Plain	$ .80
Shoeing, New, Numbers 2, 3 & 4	1.00
Shoeing, New, Number 5	1.25
Resetting old shoes	.50
Shop-made mattocks	1.50
Sprouting hoe	1.00
Brand hoe	.35
Doublin Hook	1.25

WOOD WORK.

Wagon tongue, without hounds	$2.50
Wagon reach—15 feet	1.50
Hind bolster	2.00
Front bolster	2.00
Hind hounds	2.00
Front hounds $2.50 &	3.50
Doubletree	.75
Singletrees, per pair	2.00
Whiffletrees and yoke	2.50
Resetting tires	2.00

BUGGY WORK.

Painting buggies—2 coats	$6.00
New fifth wheel	3.00
New axles	6.00
New trees	2.50
Reset tire	3.00
New reach—double	2.50
Bow sockets, each	.50
New yoke work	1.00

Other prices are of about the same proportion. W. A. FOX, West Virginia.

Comment On Several Topics.—Don't be afraid of me—I am only 5 feet 5 inches tall, weigh 140 pounds and am a greenhorn, or if you like it better, an "alien." Horrible, isn't it? I am just reading THE AMERICAN BLACKSMITH, so you see I haven't got far.

"Under a costly canopy." Now, why should not a blacksmith be under a costly canopy as well as a banker? Doesn't he do as much good in this world? There are fewer blacksmiths going to jail.

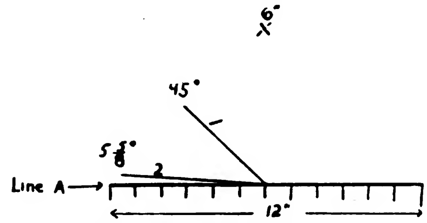
"Your brother-readers will enjoy your items." Well, I don't know about that, as I may roast some. Whom will I roast first? The man who says he has a competitor. Why? Because there is no need for competition. Some will say, "What a silly thing to say." Brothers, have you ever looked at engineers or conductors on the railway? Are they competitors? No, each one carries his button and is glad to meet his fellow-workman. All talk and learn from each other.

I have been with blacksmiths who thought they knew it all, and that they held the secret key to all the knowledge, and would have hated to have their brother learn anything. Now, some of our brothers tell what they have done. I don't think we want to know what they have done unless we learn how they did it, and all the measurements, too. Now, Brothers, when you write what you have done, let's know how.

I would like to see every blacksmith wearing his button. A perfect circle is a hard thing to make, I know. Why not have a pin or a button with a circle as a blacksmith's emblem? Why not have all the readers of THE AMERICAN BLACKSMITH wear one? Our circle of Friendship—if we help one another, others will help us, too.

J. MULLARKEY, New York.

Dividing the Angle Again.—I wish to make a few remarks on dividing the angle, in reply to Mr. A. W. Barnard, who says that if I will study my figures I will find I am wrong. I see there is a great misunderstanding about the dividing of the circle. In Brother Louis Ferrell's article he went to the bother of drawing a full circle in order to get a base line and a perpendicular line, so as to get a foundation from which to draw a 45-degree and $5\frac{5}{8}$-degree line, and he called it dividing the circle. The fact of the matter was, he had nothing to do with dividing the circle; all he was trying to do was to get the right degree of angle at which to bend his irons, and he said if anyone had an easier way he would like to hear it. So I gave my plan, which is to simply draw a base line 12 inches long and a perpendicular line 6 inches long in



DIVIDING THE ANGLE AGAIN

the center of my base line. This latter line is used for nothing but to have a starting point in getting the angle lines. We might just as well make a dot at the top of the perpendicular line. As I have illustrated it, we merely draw the base line and the two angle lines by which we wish to bend our iron.

Mr. A. W. Barnard, who commented on my article in the December issue, says I am wrong, and he goes to work and draws a triangle and leaves the extension base line off. A man would think by the way he begins to explain his method that he is trying to give the measurements of a battleship. He must understand that we are not all college-bred smiths, and that we work from more simple plans. My illustration which I send herewith is as simple as it can be made, and gives all our Brother explained in his article, namely: Heat and bend the end and lay on base line, and when it fits line 1 you have a 45-degree angle, and when it fits line 2 you have a $5\frac{5}{8}$-degree angle.

C. W. METCALF, Nebraska.

A Letter from New Zealand.—I would not be without "Our Journal." I reckon that you have some flyers over there, shoeing. They will set fire to themselves if they are not careful. I was also reading Mr. Mann's letter about doing $3\frac{1}{2}$ minutes per shoe. I am only a young one at the trade (about 7 years), but have seen some pretty good men. Once or twice I have nailed on and finished off a set of shoes in ten minutes, and reckon that was fast enough for anything. I have made 35 and 38 shoes in an hour, but would not try to keep it up all day.

I have only a small shop fitted up with a Buffalo 200 blower, a set of Little Giant stocks and dies, and a good drilling machine. I do principally shoeing and general repairs.

I don't like the way we shoe here. Here we have mostly bush farms and soft roads, and the lightest shoe is $\frac{5}{8}$ by $\frac{3}{8}$ and the heaviest is 1 by $\frac{3}{8}$. You have to shoe very close and short, whereas if we had hard roads it would be a bit different. I also reɔkon some of the so-called shoers about here ought to be held up for cruelty to dumb animals. A horse came in the other day and I removed his shoes. I made them 1 inch by $\frac{1}{8}$ wider and had to draw the shoe about $\frac{3}{8}$ of an inch each side. Now, that is no good at all.

I would like to meet J. C. Weaver. His remarks on anatomy and care of hoofs coincide exactly with mine.

As I said before, I make all my own shoes, I have tried several kinds of machine shoes. but there are none like your own make. The best machine shoes were British and Continental. The others were fullered too fine and straight and made it almost impossible to get the nails up. I use Capewell nails and reckon they are A-1. I get 5s ($1.22) for hacks, 6s 6d ($1.52) for draughts and 7s 6d ($1.82) for heel and toe. I split an old rasp down for toes. These methods might seem strange to you up-to-date shop owners, but we have not sufficient trade to get up-to-date machinery. I have to cut and weld all tyres and get 15s ($3.65) per pair up to $1\frac{1}{2}$ inch wide.

I also reckon Wm. Camsey is correct in his remarks, and wish that all farriers had to be certificated.

I would like J. C. Weaver and Wm. Camsey to drop me a line in some of their spare moments and let me know what sort of a place they live in, etc. I would be pretty quick to reply to them.

WILLIAM G. SIM, New Zealand.

More Light on cold Setting.—In answer to a few articles in the latest issue of "Our Journal," I will start first with the article of Brother W. K. Huff, of Kansas, on page 129, entitled "More Cold Tire Talk." Brother Huff wants someone to tell him how a tire can be made smaller than the wheel and do it with the tire on the wheel. Now, that is just as easily done as it is to make it smaller off the wheel, only you don't have the pleasure of knowing just how much smaller you have made it, nor do you care, as long as you have your tire as tight as your wheel will stand without springing a dish in the wheel. It is a fact that if you make the tire smaller than the wheel the wheel will have to spring some. After all the joints have been drawn up until the wheel is what you would call a solid wheel, then the wheel must spring if the tire is not done shrinking. But, thanks to the new way of cold setting, we don't have to do any guesswork at all, as we can dish a wheel or leave it straight just as we choose and do it to a micrometer gauge if necessary.

There is no man who can tell just how much or how little moisture there is in a wheel and for that reason there is bound to be some guesswork when setting a tire hot.

I heard Brother Huff say one time that it did not matter about a man serving a long time learning a trade. If he had it between his eyes it would crop out if he gave hig gray matter a chance. Now is the time to practice what you used to preach, Brother Huff. Get cold tire setting between your eyes and the machine, with the assistance of your gray matter, will do the rest—that is, if you get a good machine. If you want to know what I think is the best machine on the market I will tell you if you ask me. I have used two different makes and the one I am using now I have been using for four years and have always been satisfied with it.

I have set tires for your Brother Joe and he was perfectly satisfied with the results. Now, Brother Huff, don't wonder what I am getting for writing this article, for I am not getting one cent and I don't think the Brooks people gave Brother Wright anything for his article, either. I am just having a friendly chat through "Our Good

Journal" with an old time friend, and when you find out who I am you will know that my experience as an iron roaster began before you knew me, and that was about twenty years ago. So you see I am not a beginner as you may think Brother Wright is, although I am just as enthusiastic on the subject as Brother Wright. Come again, Brother W. K. Let's make a hot subject out of a cold one.

T. S. HOLLOWAY, Kansas.

A Power Shop of California.—My shop is one of the best equipped in the county, outside of the City of Los Angeles. It it run by gas engine and I work from three to six men besides my self, according to the season of the year. I would not be without power for anything. I do as much with five men in one day as I did formerly in three days with the same number of men, and I do it better and easier. The customers are better satisfied and I find it easier to keep help. The men are in better spirits and try to please your customer as well as to please the boss and do not hesitate to work a few minutes overtime to help repair for someone who is in a hurry to have some work done.

I have branched out to repair autos and find it is a very good business for the blacksmith, If you have a good head do not think that because you never learned the auto business that you cannot repair them. I never had anyone to show me anything about an auto and I can take any of them apart and repair them from one end to the other and have no trouble. I weld auto springs and guarantee them. I have welded about one hundred springs this last summer. On some I welded all the leaves and on others one or more. And I have had only one of them break. I have all the spring work around here. I hope that the blacksmiths will all take up the auto repair work. It will pay them, besides teaching them an easier way to earn the dollar.

H. P. HENDRICKSON, California.

MR. HENDRICKSON OF CALIFORNIA ALSO DOES AUTO REPAIRING

On Some Craft Matters.—I am writing to the craft for the first time since I became a subscriber to our world-famed Journal. To tell the truth I regard our paper as the best craft paper published at home or abroad. I would not be without it. I consider it my daily shop companion. It furnishes me with all the latest and best kinks and methods of doing work as it ought to be done, I like to know all about the craft far and near. I think The American Association of Blacksmiths and Horseshoers is O. K. for the protection of the craft—it certainly needs protection. I know smiths (or men that pose as smiths) who run shops and don't know the first thing about practical blacksmithing, and yet they get all they can do and work for everybody both good and bad, and lose over half they make, not being men enough to get after their customers. And the reason is that they don't do good practical work, and have poor grounds on which to bring a kick. For instance, a smith of this species shoes a customer's horse and ruins the foot by his unskilled work. Just as likely as not the customer tells the smith about it, but the smith talks the customer out of the idea of taking his work to some good smith, assuring the customer that he will not charge him a cent for the job. Then he puts up a bluff about the animal never having had good feet and he defies any smith to better his work. These same smiths do not know the nature of steel any more than a hog knows the alphabet. They will heat it and burn it in making a tool until it is like cast iron. When used, the tool will chip all to pieces and the smith will blame it on the steel. Of course, there are several grades of steel and it takes a different grade for different tools and of course we all know, or at least should know, that one grade of steel is not adapted to all uses.

I have only been working steadily at the blacksmith trade for five years, but I can do more and better work than some smiths I know who have been at the business all their lives. They will never be smiths because it's not in them. They read no trade books nor do they keep up with the modern methods of doing work, but stick to grandfather's old fashioned ways. I liked the trade when a youngster and have stood on a big block and struck for my father many a long day when I was only eight years old. My father has been at the trade about forty years. I never was apprenticed to any smith except him. A man does not have to work at his trade all his days to learn it, as some suppose, providing he has the ability to become a mechanic. I talked to one young smith about taking the paper, but he gave me no satisfaction. I think he has an idea he knows more about smithing than Mr. James Cran or Mr. Bert Hillyer. No matter how good a smith a man is he has yet to learn a lot and learn every day, too. However, I never balk at a job. If I don't succeed one way I try another. I would rather take a week on one good piece of work than turn off fifty jobs that would come back the next day.

J. F. RUDD, West Virginia.

An Interesting Letter From Australia.—I am head coachsmith in the largest shop in this town and do all the difficult repair and jobbing work. We have three forges, have eleven men employed all the year 'round, and roughly estimate that we turn over about three thousand pounds ($14,-600.00) a year. We get good prices.

Are all your vehicles in America factory-made? Or has the automobile entirely displaced horse-drawn vehicles? I would very much like to see a column or two of our valuable paper entirely devoted to coachsmith forging, and will venture to say THE AMERICAN BLACKSMITH will be more appreciated and more widely circulated in Australasia and South Africa. I mean coach forging by the old method, without steam or trip hammer or hydraulic or any power save a blast for the forge and a hand power tire-upsetter. In short, work forged on the anvil with hand tools and heated in an ordinary forge. Why I ask for this class of work is we in Australia in country or small city shops are fifty years behind you smiths of America in modern tools and equipments. I admit there are exceptions, but most of us are chiefly in our infancy. Of course, our large engineering and foundry works are quite up to date. Automobile work is sending our city shops ahead by leaps and bounds in the way of power and equipment.

What I would like to see in "Our Journal" from time to time would be articles such as these: driving rails for cabs, buggies and sulkies; seat rails for buggies and sulkies. This work all has to be silver-plated and, consequently, free from marks and holes. Also English forecarriage works, and brakes for all classes of vehicles. Wrought turn tables, (what you call the fifth wheel) with main reach plate welded right through the top circle, and kingbolt welded in center of circle on reach plate, and hornstay welded into bottom circle each side of kingbolt. This work has to be very exact and neat. There are also scores of other forgings, on cabs, phaetons, buggies and coaches, which half of the smiths in the country are out of date in handling. In jobbing we have awkward parts to forge, such as swivels and bar chain for teamsters. You could not buy these ready-made for love or money. Forging wrought barrel hooks, say, with four-inch barrel is awkward work if you don't know the best method for doing it.

There are four or five distinctly different methods of brand making. In this part of the world every blacksmith has cattle brands to make or repair. Every smith can make them, but there are few who make first-class brands. There is one smith in this town, also a subscriber to THE AMERICAN BLACKSMITH, who is a real artist in making brands. He never rivets a brand, but forges and welds from the solid and makes them all from mild steel. If any smith would like to hear how to make any of the very complicated letters that have to be used now-a-days to make brands I feel sure our brother smith of this town will give any information quite readily. Of course you won't get the same brand to make twice, but the method is similar.

With most of this class of work I am familiar, but would like to see other smiths' methods. This is what keeps us up to date, for though we may not altogether agree with another's style there will always be something new to learn or suggest itself. For myself I am only too happy to give any information desired. As a coachsmith I have taken first prizes in four different towns in this county during the past four years.

CHAS. J. LATTER,
New South Wales, Australia.

VOLUME 10

THE FILE COPY

NUMBER 10

AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y. U.S.A.

JULY, 1911

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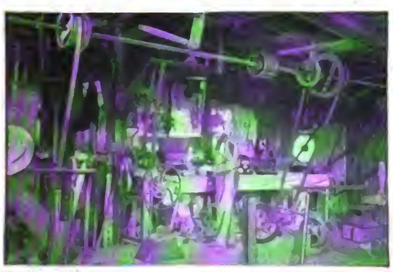
J. N. COOK, Richland, Iowa.



"We use our engine in a general blacksmith, carriage and machine repair shop. It runs a 12-ft. 17-in. swing iron lathe, trip hammer, emery stone, saw gummer, drill and Challenge feed mill on first floor; and 18-in. rip saw, 16-in. planer, 26-in. band saw, boring and tenoning machine, and 12-ft., 30-in. swing, wood lathe and cider mill on the second floor. As far as power is concerned, no one need be afraid to buy a Galloway 5 H. P., for it will do all you will ever need it to do. The fuel consumption is very low."
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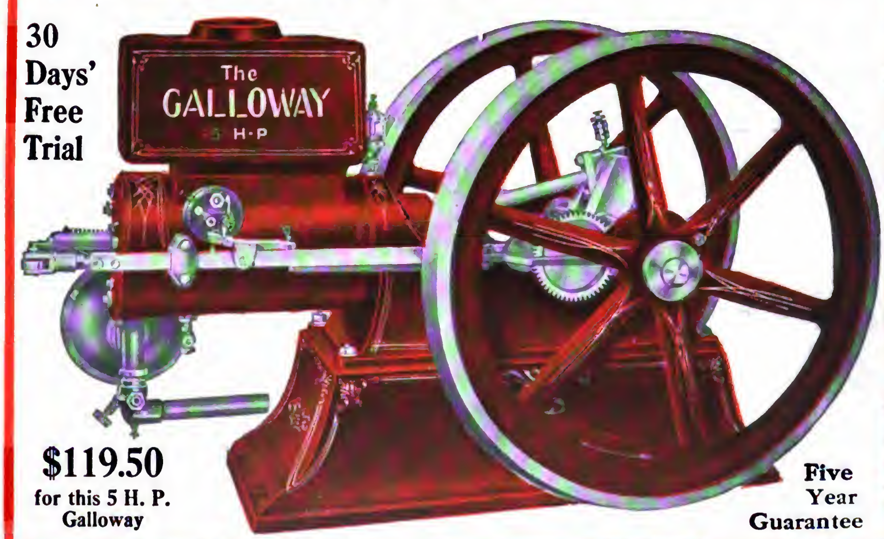

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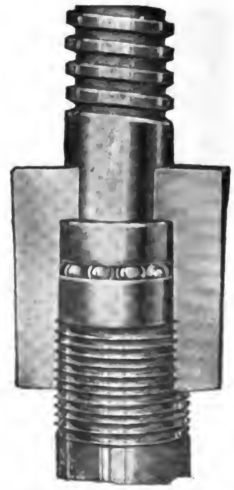
Silver's New Ball Bearing Self-Feed Post Drills

WITH INTERMEDIATE GEAR

Made in three sizes, Nos. 22, 23 and 24. The intermediate gear eliminates the necessity of turning crank the reverse direction on slow speed. Drills are constructed from entirely new patterns, and are strong, rapid and complete. Have adjustable table. The ball bearing feed nut saves 20 to 50% in power. Balls of best quality steel are carried in case-hardened steel discs.

Drill has ground bearings, machine-molded gears and automatic feeding device, which gives nearly a continuous feed, avoiding jamming and breaking of bits. The feed can be increased or diminished by simply turning a thumb screw.

Spindle and shafts are of steel, with bearings bored and reamed in solid frame.



New Ball Bearing Feed Nut used on Nos. 21, 22, 23 and 24 Drills.

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This beautiful book is FREE. Fully illustrates and describes our complete line of new Band Saws, Saw Tables, Jointers, Swing Saws, Post Drills, 20-inch Power Drills, Portable Forges, Etc.

Write Today to the Address Above

Fig. 642. No. 22.

Made with Ball Bearings and Intermediate Gear. Fast or Slow Speed. Hand or Belt Power. Perfect Drills for work of all kinds.

Fig. 644. No. 22.

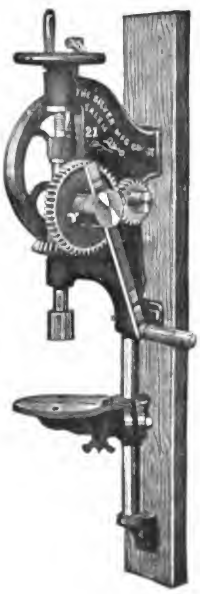

Fig. 641

No. 21 Hand Post Drill

With Ball Bearings Hand or Self-Feed, Two Speeds. Made from entirely new patterns.

For Hand Power only.

The American Blacksmith is published monthly at The New Sidway Building, Buffalo, N. Y., U. S. A., by The American Blacksmith Company. Incorporated under New York State Laws. Entered, February 12, 1902, as second-class mail matter at Buffalo, N. Y. Act of Congress, March 3, 1879.

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Walter O. Bernhardt, - Editor.

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Subscription Price: $1.00 per year in advance, prepaid to any postoffice in United States or Mexico. To Canada and other countries, $1.50, or, 6 shillings. Reduced rates to clubs of five or more on application. Domestic long-time rates, strictly in advance: Two years, $1.60; three years, $2.00; four years, $2.50; five years, $3.00. Single copies, 10 cents. Cable address, "Blacksmith," Buffalo.

Subscribers should notify us promptly of non-receipt of paper or change of address. In the latter case it is necessary that you give us both the old and the new address.

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The following jobbers are now selling AMERICAN BLACKSMITH Subscription Coupons (other jobbers will be named as soon as arrangements can be completed):

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ASSOCIATION SECRETARIES.

Arrangements will also be made with the secretaries of the larger associations to handle AMERICAN BLACKSMITH Subscription Coupons. Additional names of secretaries will be announced as these arrangements are completed.

Austin English, Secretary-Treasurer, Kansas State Association, Hutchinson, Kan.

Our Journal and One Other

When a subscriber to two blacksmith papers writes a letter comparing those two papers you may be sure of receiving some sound, reliable information regarding trade papers in general and smithing papers in particular. We received just such a letter a short time ago from one of "Our Folks" in Pennsylvania. This subscriber writes: "THE AMERICAN BLACKSMITH is superior to (the other paper). In the first place THE AMERICAN BLACKSMITH is a neater book and contains much more information in all branches of blacksmithing. It also contains more ads which give valuable information. It has more engravings in it and there is more information on every subject that the blacksmith is interested in. Any man who sees the two papers side by side will agree with me."

Could you look for a better comparison? Here's a letter from a man who knows both papers thoroughly. He has placed them side by side and looked at each point in comparing them, and naturally his verdict could be no different. A fair, square and impartial comparison of THE AMERICAN BLACKSMITH with any other paper in the smithing craft cannot be other than favorable to "Our Journal."

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Are You In Need?

Are you in need of any items of shop equipment? Do you want any tools, machines or supplies? If you do, just let us know what you want and about when you will want it. Whether or not the material is advertised in "Our Journal," we can put you in touch with reliable manufacturers or dealers. If you want special information, descriptions of machines, catalog prices, or want anything else connected with blacksmith shop equipment, let us know, and we will put you in touch with the right firm.

English and American Currency

We are again in receipt of several requests for an explanation of the relative values of English and American currency. This subject seems to puzzle many of "Our Folks" in other countries, and we therefore address this talk principally to them in the hope that they will get a better understanding of English and American money values.

The penny in English money is equal to two American cents. The shilling of English currency is worth twenty-four and one third cents, while a pound sterling is valued at four dollars and eighty-six and two thirds cents. The following table will perhaps make this clear:

1 cent	(written $ .01)	equals	½d.
2 cents	(" $ .02)	"	1d.
12 "	(" $ .12)	"	6d.
25 "	(" $ .25)	"	1s. 1d.
50 "	(" $ .50)	"	2s. 2d.
1 dollar	(" $1.00)	"	4s. 2d.
1 "	and 25 cents ($1.25)	"	5s. 2d.
1 "	and 50 cents ($1.50)	"	6s. 2d.
1 "	and 75 cents ($1.75)	"	7s. 3d.
2 dollars	(written $2.00)	"	8s. 3d.
3 "	(" $3.00)	"	12s. 4d.
4 "	(" $4.00)	"	16s. 6d.
5 "	(" $5.00)	"	£1 0s. 8d.

If you will refer to the above table when in doubt regarding the English currency equivalent of any American prices you will have little difficulty in figuring currency values. For example, suppose you desire to purchase something priced at $2.50. By refering to the above table you will see that the equivalent of two dollars in English currency is eight shillings three pence, while fifty cents in American money is the same as two shillings two pence in English coin. Then it is but an extremely simple matter to add eight shillings three pence to two shillings two pence to get the English equivalent for $2.50. The table may be used similarly for any other prices.

HARVESTING WHEAT IN ARGENTINE REPUBLIC, SOUTH AMERICA

Doing Work Easier, Quicker and Better

PAUL V. BURGESS

THE SUBJECT of shop equipment is one that every Blacksmith and wagon-maker should be interested in. As soon as the gasoline engine reached its present high state of perfection, the blacksmiths were among the first to realize its possibilities and quickly availed themselves of the opportunity to better their condition. I believe I can make the assertion without fear of contradiction that the advent of the gasoline engine is going to be the means of changing the whole blacksmithing industry from one of drudgery, poor pay and long hours to one of the most pleasant of the trades, with better pay, less of the heavy back breaking work and shorter hours.

And now since we have such good, dependable, cheap power we are brought face to face with another problem and it is one of great importance and worthy of the most earnest consideration. It is—What machines are best suited for my work? Since the gasoline engine has come into such general use a great many manufacturers have devoted a large part of their time designing and building machines especially for blacksmith and wagon shop use, and at the present time if you will refer to any journal treating on the subject, you will find page after page of advertisements of machines that are built expressly for shop use.

As to the proper machines to install that is a hard question to answer. One has to be governed entirely by the class of work to be done, and this differs very widely in different sections of the country. Take for instance the blacksmiths in our great wheat belts. They depend largely on plow-sharpening and disc-rolling and repairing threshing machinery. They would want an engine, lathe drill press, trip hammer, disc roller, and power forge. Right across in another state some other smith might be in a hilly, rocky country where they use cast shares and have to keep the horses shod to lead them to water. This man would need a cold tire setter and shoeing stocks. But there are some machines that are so easily adapted to most all kinds of work that I think they should be in every repair shop. I am not much in favor of the universal machines. For my use, I prefer every one a unit by itself and my reasons are that you do not have to stop and make adjustments in the rush hours. If you have all your machines fitted with counter shaft or tight and loose pulleys, you can go from one to the other as your needs may require and by simply shifting a lever the machine is ready in an instant to serve you.

MR. ROBERT WEEK'S SUBSTANTIALLY BUILT GENERAL SHOP IN NEBRASKA

The most valuable machine for the wood worker is the band saw. With a 32- or 36-inch saw you can do any kind of ripping or scroll sawing. You can make tongues, hounds felloes, coupling poles or anything you want and you do not need any rip or cross cut machines as the band saw will do all these things with ease. And then you need a hand planer, eight or twelve-inch. With these two, any good wagon maker can


MR. C. L. PALMER'S SHOP IN WISCONSIN. BESIDE GENERAL BUILDING AND REPAIRING, HE ALSO HANDLES AUTOMOBILE OIL AND GASOLINE

double his earning capacity and will find his work much lighter and cleaner.

For the blacksmith, the first two are the emery stand and power drill. One who has never used a polishing and grinding outfit cannot realize the difference in filing up a fit or finish on a forging and then doing the same work on a good emery outfit. Second to it only, is the power drill. As you all know, cranking a drill is pretty hard work, but let me tell you it is much nicer after welding up a share and bar, to light your pipe and sit down at the drill and let the engine do the turning.

These four machines with a good 5-horsepower engine will relieve you of much of the heavy work, besides will enable you to turn out the same amount of work in much less time. Of course if you want to invest a little more money, you should get a trip hammer and power forge. This will give you an equipment of which you may well be proud and will give you new life and a new start and when your customers come in and hear the "bark" of your engine and listen to the "whirr" of your machines and see how much easier and faster you can turn out your work you will find that you occupy a new position in the business world. You will find that you are getting good profits out of work that you had never been able to make pay before. You can buy all your wagon material in the rough and turn it out in a first class manner at short notice. We have been using power for ten years and it is the only way. If I had to give up my engine and machines, I would think I had lost my best friends.

A Railroad Blacksmith Shop Conveniently Equipped.

J. J. Conners

Our shop is located parallel to the machine and erecting shop and is conveniently located both to this shop and to the bolt cutting shop. The building is of fire-proof construction, of brick and steel with slate roof. In the southeast corner is located the foreman's office, where an unobstructed view of the entire shop can be had.

Three circular open forges, built in the company's shops, take care of the heavier work, two of these at south end of shop, convenient to the two thousand pound hammer are used principally for frame work.

Four double forges, of McCaslin make, with hoods and cast iron smoke jacks extending through the roof are placed along the east side of shop and take care of the lighter forging of the shop.

Five Ferguson oil furnaces are in use as follows: One two feet, ten inches by four feet, six inches hammer furnace; one combined case hardening and spring furnace; one Bradley hammer furnace; one furnace for two-inch forging machine, one furnace for one and one-half-inch bolt heading machine, one small coke furnace is placed conveniently to the two-inch forging machine and heats stock for making the coupler yokes and similar forgings on this machine.

Two steam hammers are in use, one of these a two thousand-pound single frame Bement hammer with 33-inch stroke, the other a twelve hundred pound Sellers hammer. Other tools include the combined punch and shear built by Lang & Allstatter Company, two hundred-pound Bradley helve hammer, two-inch Acme Forging machine and one emery grinder.

Portable face plates, a revolving tool rack for steel hammer tools, cast iron cooling water boxes and the jib cranes make the shop a most convenient one for the workmen.

All machine tools are driven by individual motors, a four-hundred volt, two phase, sixty cycle power circuit being brought into the distribution panel at north end of shop and each individual circuit is lead off in conduit to the different motors.

Steam for the hammers is brought into the shop through underground mains, while the exhaust from the hammers is piped directly into the sewer.

Water mains attached to the roof trusses supply each forge and cooling box and the foreman's office.

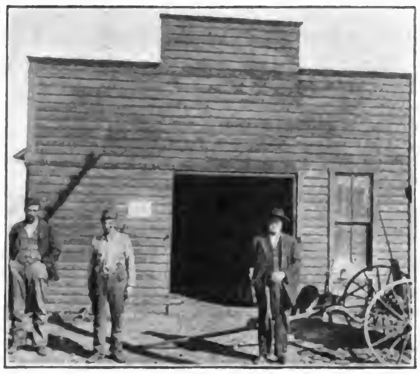
Oil for the furnaces is stored in a main reservoir in an underground concrete vault, located some sixty feet from the north end of the building. This oil is brought into the shop through underground mains and is piped to the various furnaces under air pressure. One No. 9 Special, Sturtevant blower direct connected to a 50-horsepower induction motor, and one No. 2 Root Blower gear connected to a 7½-horsepower induction motor furnish the blast for the forges and furnaces. The Root blower is connected to the main blast pipe line, but is used as an auxiliary to the large blower for night work or on Sunday. These two blowers are located in a small brick building adjoining the north end of the shop.

The blast piping is of heavy galvanized iron and is supported on the roof trusses, and with the exception of the pipes to double forges, the branch pipes are run to the side walls, thence down the wall to eighteen inches above the ground where they enter wrought iron piping laid

THIS POWER SHOP OF LOUISIANA IS OPERATED BY A SIX-HORSE POWER ENGINE. THE MACHINE EQUIPMENT IS VERY COMPLETE

underground and connected to the forges and furnaces, thus no blast piping is exposed to injury by cranes or otherwise.

All door openings are provided with Kinnear steel rolling doors. For night lighting five A. C. multiple arc lamps are provided, also, one incandescent circuit supplies lighting for the foreman's office and for setting tools, etc., at the two forging machines. All of lighting circuits are run in iron conduit and are controlled from a distribution panel at south end of building convenient to the entrance door to shop.



MR. JOHN R. SHOOP—A SIXTY-YEAR OLD SMITH RUNS THIS TWO FIRE OKLAHOMA SHOP

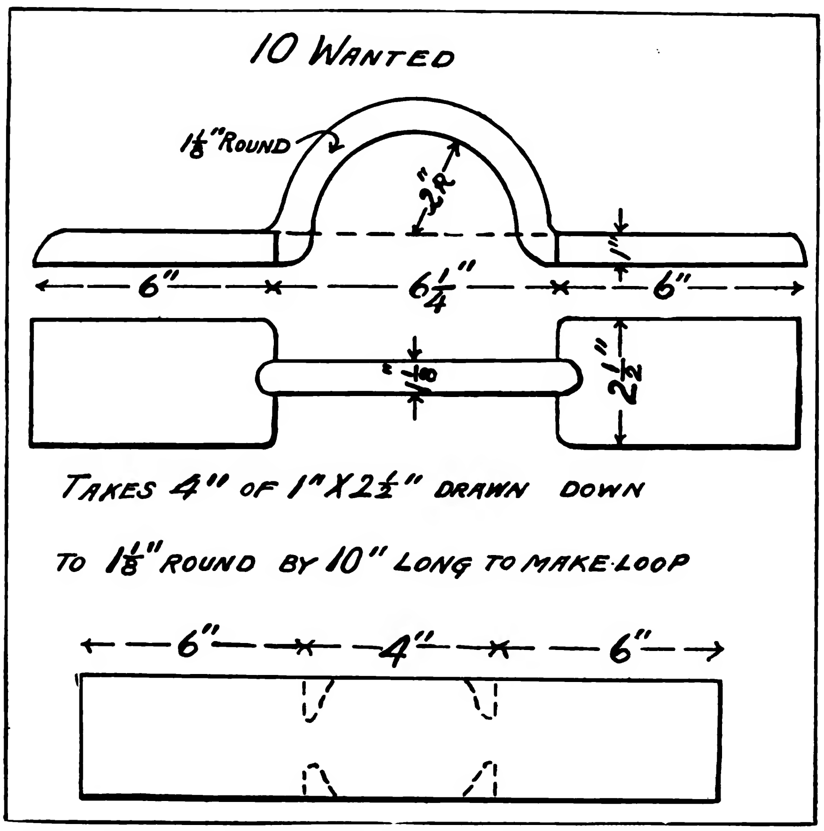
System in the Smith Shop

Bert Hillyer

It is the desire in all smith-shops to turn out work well done, in as large a quantity as can be made in a day and with as few men as possible to do the work. To do this it requires competent men who know how to handle up-to-date tools, and a competent man who knows how to handle the men. Among smiths there may be found men who are better adapted to some one special class of work than are the others. These should be picked out and given the work they can do the best; every man should do the work for which he is best suited. In this way you get the best results from the men and the men themselves feel better satisfied.

One great drawback in most shops is the time it takes the smith and helper to get the iron from the place where it is kept, to get ready the necessary tools to work it, and to figure out how much stock it will take to do the job. The smith will go over his figures twice perhaps and then hesitate before starting the job for fear of having made a mistake. If, however, the foreman should give him a sketch or print with the amount of stock required marked plainly on it, and also has the iron and tools brought to the smith's anvil, there is no time lost and the smith can cheerfully go ahead with his work without being worried about making a mistake in the figuring, which really is the foreman's work.

Another bad practice is talking loudly to a man. This only serves to distract the attention of the other men and keeps them from their work. If a man does a thing wrong or turns out a poor piece of work, tell him about it quietly. And be just as quick to praise him when he does a good job.



THE DRAWING OR BLUE PRINT TELLS THE SMITH HOW MANY PIECES ARE WANTED, THEIR SIZE AND THE STOCK TO USE

Some Smithing Thoughts and Experiences.

Charles Chism

Have you ever thought of how the blacksmith came to get the name of "Honest Blacksmith?" I have been thinking it over and these are some of the thoughts that came to my mind.

The farmers impose on the blacksmith. I have often repaired binders and other machinery and upon the farmers asking me the charge, I would say, "Oh, about 25 or 30 cents. cents." The farmer with a grin would say, "Gee, if I had to send it to the factory, it would cost me three or four dollars and I would have had to wait five or six days for it." But if I had asked him a dollar or a dollar and a half, he would never have come into my shop again and would have advertised it to all the farmers in the vicinity. Last spring I repaired a spring on a wool-clipping machine and the man made me set my price before he would let me repair it. I told him I charged $ .40 an hour while working on it. He was afraid I would cheat him, so I said, "Give me thirty cents and I will put in the spring." He was well pleased and said that a new spring at the factory would cost about $2.50. Being only a blacksmith, however, I could only get thirty cents. So it may easily be seen that the blacksmith is more imposed upon than any other mechanic. There is an old saying that says "All that is required to make a blacksmith is a faint heart, a weak mind and a stiff back."

Another thing I have observed is that farmers go around to the different shops saying tbat blacksmith so-and-so said something about another

smith and did their work cheaper. And when the truth is discovered, it will be found that their statements were entirely false. They try to cause dissension among the smiths so they will cut the prices.

Also the blacksmith is the most accomodating man there is in business. I have worked in several shops all over the country and find they are all the same. I have at times been sent out to tighten shoes on strangers' horses, have gotten under wagons and buggies to tighten bolts and was not allowed to charge a cent; but let Mr. Blacksmith go into other places of business, he soon finds that "Thank you" doesn't pay his bills.

Kinks and Short Cuts for Blacksmiths

A READER

Some blacksmiths are experts in the use of tools, in the judging of heats and in short, masters of their profession as far as skill goes. Still many of them come short in other things which are equally important in the carrying out of work without waste of time or material, both of which mean money on the right side of the balance sheet when handled economically.

The following kinks and short cuts which the writer has collected from time to time are not new and doubtless a number of readers of THE AMERICAN BLACKSMITH are familiar with them, or at least some of them. Still, it is likely that some may derive a little benefit from them.

In the May issue of THE AMERICAN BLACKSMITH of last year there appeared an article on solid forgings. In connection with that article, there was a table giving the weight of round stock from one inch in diameter up to thirty-six inches diameter in lengths of one inch or plates of that thickness in pounds, ounces and fractions thereof. The table in question has proved a great time saver in the calculating of material for forgings not only to those not well posted in figuring out cubic capacities, but to those thoroughly conversant with the subject. It only means a case of simple addition to arrive at a very close approximate of the weight of any piece of round stock iron or steel, there being only 2% difference between the weights of the two materials. A similar table of square stock, is here given in Fig. 1.

WEIGHT PER INCH OF SQUARE HAMMERED IRON OR WEIGHT OF SQUARE PLATES 1 INCH THICK AND FROM 1 INCH UP TO 36 INCHES SQUARE

SIZE INCHES	WEIGHT LBS.	OZ.	SIZE INCHES	WEIGHT LBS.	OZ.	SIZE INCHES	WEIGHT LBS.	OZ.	SIZE INCHES	WEIGHT LBS.	OZ.	SIZE INCHES	WEIGHT LBS.	OZ.	SIZE INCHES	WEIGHT LBS.	OZ.	SIZE INCHES	WEIGHT LBS.	OZ.
1		4 1/2	6 1/4	10	15	11 1/2	37	1/2	16 3/4	78	8 9/10	22	135	8 1/3	27 1/4	207	14 2/3	32 1/2	295	12
1 1/8		5 6/10	6 3/8	11	6	11 5/8	37	13 1/3	16 7/8	79	11 3/4	22 1/8	137	1	27 3/8	209	13 3/10	32 5/8	298	4 2/3
1 1/4		7	6 1/2	11	13 3/10	11 3/4	38	10 1/2	17	80	14 3/4	22 1/4	138	9 7/8	27 1/2	211	12	32 3/4	300	5 1/10
1 3/8		8 1/2	6 5/8	12	4 6/10	11 7/8	39	7 2/10	17 1/8	82	1 8/10	22 3/8	140	2 7/8	27 5/8	213	10 7/8	32 7/8	302	9 8/10
1 1/2		10 1/10	6 3/4	12	12 1/10	12	40	5 1/8	17 1/4	83	5 1/10	22 1/2	141	12	27 3/4	215	9 3/4	33	304	14 3/4
1 5/8		11 8/10	6 7/8	13	3 7/10	12 1/8	41	2 6/10	17 3/8	84	8 1/2	22 5/8	143	5 3/10	27 7/8	217	9	33 1/8	307	3 3/4
1 3/4		13 7/10	7	13	11 1/2	12 1/4	42	1/4	17 1/2	85	12	22 3/4	144	14 7/10	28	219	8 1/3	33 1/4	309	8 9/10
1 7/8		15 7/10	7 1/8	14	3 3/8	12 3/8	42	14	17 5/8	86	15 2/3	22 7/8	146	8 1/4	28 1/8	221	7 3/4	33 3/8	311	14 7/10
2	1	1 9/10	7 1/4	14	11 1/2	12 1/2	43	12	17 3/4	88	3 1/2	23	148	2	28 1/4	223	7 1/3	33 1/2	314	3 7/10
2 1/8	1	4 2/10	7 3/8	15	4 1/10	12 5/8	44	10	17 7/8	89	7 4/10	23 1/8	149	11 3/4	28 3/8	225	7	33 5/8	316	9 9/10
2 1/4	1	6 2/3	7 1/2	15	12	12 3/4	45	8 1/4	18	90	11 1/2	23 1/4	151	5 7/10	28 1/2	227	6 9/10	33 3/4	318	15
2 3/8	1	9 2/10	7 5/8	16	4 4/10	12 7/8	46	6 1/2	18 1/8	91	15 3/4	23 3/8	152	15 8/10	28 5/8	229	6 7/8	33 7/8	321	4 7/8
2 1/2	1	12	7 3/4	16	13	13	47	5 1/8	18 1/4	93	4 1/8	23 1/2	154	10 1/10	28 3/4	231	7	34	323	10 7/10
2 5/8	1	14 8/10	7 7/8	17	5 5/8	13 1/8	48	3 7/10	18 3/8	94	8 5/8	23 5/8	156	4 1/2	28 7/8	233	7 3/10	34 1/8	326	1
2 3/4	2	1 7/8	8	17	14 3/4	13 1/4	49	2 1/2	18 1/2	95	13 3/10	23 3/4	157	15	29	235	7 7/10	34 1/4	328	7 3/10
2 7/8	2	5	8 1/8	18	7 7/10	13 3/8	50	1 4/10	18 5/8	97	2 1/10	23 7/8	159	9 2/3	29 1/8	237	8 1/4	34 3/8	330	13 3/4
3	2	8 3/10	8 1/4	19	9/10	13 1/2	51	1/2	18 3/4	98	7	24	161	4 1/2	29 1/4	239	8 9/10	34 1/2	333	4 1/2
3 1/8	2	11 7/10	8 3/8	19	10 1/8	13 5/8	51	15 5/8	18 7/8	99	12 1/10	24 1/8	162	15 4/10	29 3/8	241	9 3/4	34 5/8	335	12
3 1/4	2	15 3/10	8 1/2	20	3 7/10	13 3/4	52	15	19	101	1 3/10	24 1/4	164	11 2/10	29 1/2	243	10 3/4	34 3/4	338	1 7/8
3 3/8	3	3	8 5/8	20	13 1/4	13 7/8	53	14 4/10	19 1/8	102	6 5/8	24 3/8	166	5 3/4	29 5/8	245	11 8/10	34 7/8	340	8 7/8
3 1/2	3	6 9/10	8 3/4	21	7	14	54	14 1/10	19 1/4	103	12 1/8	24 1/2	168	1 1/8	29 3/4	247	13	35	343	
3 5/8	3	10 8/10	8 7/8	22	9/10	14 1/8	55	13 3/4	19 3/8	105	1 4/10	24 5/8	169	12 5/8	29 7/8	249	14 1/2	35 1/8	345	7 3/10
3 3/4	3	15 1/8	9	22	10 7/8	14 1/4	56	13 7/10	19 1/2	106	7 1/2	24 3/4	171	8 1/4	30	252		35 1/4	347	14 7/10
3 7/8	4	3 2/10	9 1/8	23	5	14 3/8	57	13 9/10	19 5/8	107	13 3/8	24 7/8	173	4 1/10	30 1/8	254	1 2/3	35 3/8	350	6 1/4
4	4	7 7/10	9 1/4	23	15 3/10	14 1/2	58	13 9/10	19 3/4	109	3 1/2	25	175		30 1/4	256	3 1/2	35 1/2	352	13 9/10
4 1/8	4	12 1/6	9 3/8	24	9 3/4	14 5/8	59	14 1/8	19 7/8	110	9 2/3	25 1/8	176	12 1/10	30 3/8	258	5 4/10	35 5/8	354	5 7/10
4 1/4	5	1	9 1/2	25	4 3/8	14 3/4	60	14 2/3	20	112		25 1/4	178	8 3/10	30 1/2	260	7 1/2	35 3/4	357	13 7/10
4 3/8	5	5 3/4	9 5/8	25	14 9/10	14 7/8	61	15 1/4	20 1/8	113	6 1/2	25 3/8	180	4 5/8	30 5/8	262	9 3/4	35 7/8	360	5 7/8
4 1/2	5	10 3/4	9 3/4	26	9 7/8	15	63		20 1/4	114	13 1/10	25 1/2	182	1 1/8	30 3/4	264	12 1/8	36	362	14 1/10
4 5/8	5	15 8/10	9 7/8	27	4 8/10	15 1/8	64	7/8	20 3/8	116	7 3/8	25 5/8	183	13 3/4	30 7/8	266	14 5/8			
4 3/4	6	5 1/10	10	28		15 1/4	65	1 7/8	20 1/2	117	10 3/4	25 3/4	185	10 1/2	31	269	1 3/10			
4 7/8	6	10 4/10	10 1/8	28	11 1/4	15 3/8	66	3	20 5/8	119	1 3/4	25 7/8	187	7 4/10	31 1/8	271	4 1/10			
5	7		10 1/4	29	6 2/3	15 1/2	67	4 3/10	20 3/4	120	8 8/10	26	189	4 1/2	31 1/4	273	7			
5 1/8	7	5 2/3	10 3/8	30	2 1/8	15 5/8	68	5 7/10	20 7/8	121	14 5/8	26 1/8	191	1 2/3	31 3/8	275	10 1/10			
5 1/4	7	11 1/2	10 1/2	30	13 9/10	15 3/4	69	7 3/10	21	123	7 7/10	26 1/4	192	15	31 1/2	277	13 3/10			
5 3/8	8	1 4/10	10 5/8	31	9 2/3	15 7/8	70	9/10	21 1/8	124	15 3/10	26 3/8	194	12 9/10	31 3/8	280	5/8			
5 1/2	8	7 1/2	10 3/4	32	5 7/10	16	71	10 9/10	21 1/4	126	8	26 1/2	196	10 1/10	31 3/4	282	4 1/8			
5 5/8	8	13 7/10	10 7/8	33	2 1/4	16 1/8	72	12 8/10	21 3/8	127	14 7/8	26 5/8	198	7 8/10	31 7/8	284	7 3/4			
5 3/4	9	4 1/10	11	33	14 1/10	16 1/4	73	15	21 1/2	129	6 9/10	26 3/4	200	5 7/10	32	286	11 1/2			
5 7/8	9	10 1/2	11 1/8	34	10 4/10	16 3/8	75	1 1/4	21 5/8	130	15	26 7/8	202	3 3/4	32 1/8	288	14 4/10			
6	10	1 3/10	11 1/4	35	7	16 1/2	76	3 7/10	21 3/4	132	6 4/10	27	204	2	32 1/4	291	3 1/2			
6 1/8	10	8	11 3/8	36	3 6/10	16 5/8	77	6 1/4	21 7/8	133	14 1/2	27 1/8	206	1/4	32 3/8	293	7 2/3			

FIG. 1—TABLE SHOWING WEIGHT OF SQUARE IRON

TO FIND THE WEIGHT OF ROUND STEEL

It often happens that tables of weights or hand books are not at hand at the time that the weight of a piece of steel is to be figured. When such is the case and the steel be round, reduce the diameter to quarters, square the quarters and divide by six. Example: if the diameter of the steel is 2½ inches; 2½ = $\frac{10}{4}$—10 squared is equal to 100; 100 divided by six gives the weight as 16⅔ pounds. Comparing this weight with the weight of 12 inches of 2½ round steel given in hand books which is 16.69 pounds, it will be seen that the rule works out so close that it may be said to be absolutely correct. However, should the diameter of the material to be figured on run in eighths instead of quarters such as stock 2⅝ inches in diameter, the eighths are squared in the same manner as quarters but the constant to divide by, is 24 instead of 6.

THE WEIGHT OF SQUARE OR RECTANGULAR MATERIAL

To ascertain the weight of square or rectangular stock per foot it is squared, the square multiplied by 10 and divided by 3. Example: 2x4 inches = 8 square inches; 8x10 = 80; 80 divided by 3 gives the weight as 26⅔ pounds. Comparing this weight

26⅝ pounds with tables of weights in hand books we find that 2x4 steel is given as 27.20 pounds, which shows that the rule works out about 2% light for steel and approximately correct for wrought iron.

To Use a Square as a Protractor.

It is only on rare occasions that we find a protractor in the equipment of blacksmith shops and the smith has often difficulty in arriving at anything like a definite conclusion regarding angles. But this difficulty can be overcome to a certain extent by the use of an ordinary graduated try square and a bevel square, tools which are or at least ought to be in every blacksmith shop. The method of finding a close approximate of any desired angle is as follows: Use the ninth graduation on one arm of the square as a base to work from. A straight line from there to the first graduation on the other arm is approximately five degrees, to the second graduation ten degrees and so on, each graduation being approximately five degrees until when the ninth graduation is reached it is exactly forty-five degrees. Probably this matter will be better understood by refering to the engraving in Fig. 2.

To Split Sheets Uniformly

Let us suppose there is a sheet nine inches in width to be split into thirteen strips of equal width. Ordinarily, it would take some time to figure out exactly how wide each strip ought to be, but if a rule is laid diagonally across the piece so that the extreme end of the rule is flush with one edge and the thirteenth graduation flush with the other, as shown in the diagram Fig. 3, a mark can be made at each graduation. The same thing is done at another part of the sheet and parallel lines drawn between the marks at both places. The sheet can then be split into the required number of strips without necessarily knowing their width or doing any figuring whatever.

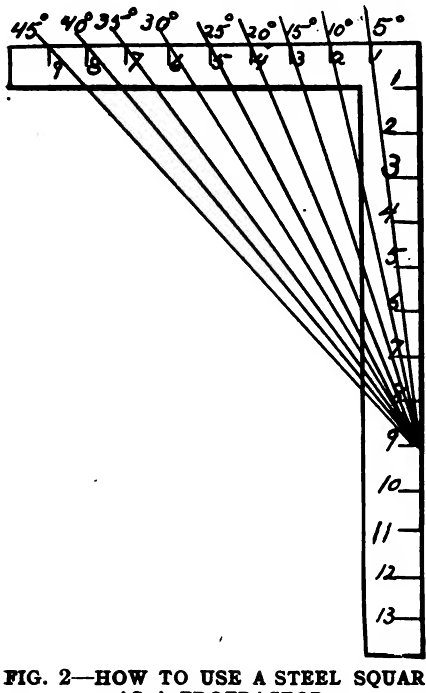


FIG. 2—HOW TO USE A STEEL SQUARE AS A PROTRACTOR

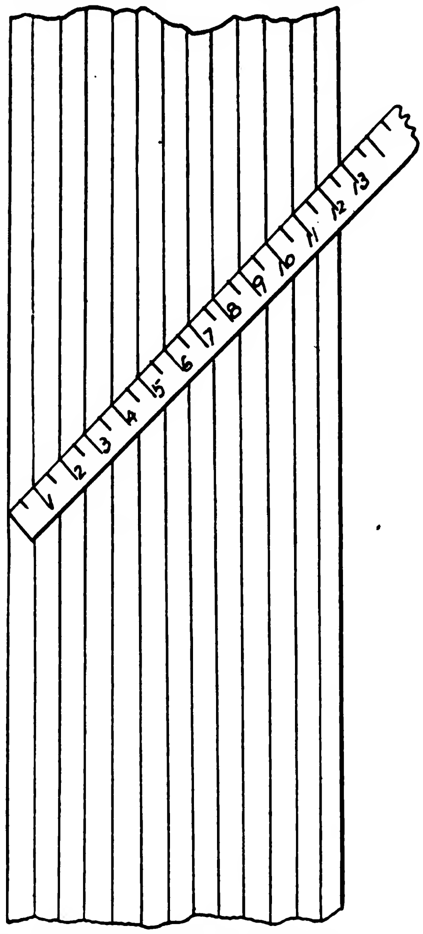


FIG. 3—A SIMPLE METHOD FOR DIVIDING SHEETS INTO EQUAL PARTS

Finding The Circumference Of Diameters

To find the circumference of a diameter as is necessary in making circular forgings such as rings, bands, etc., either of the following methods can be used with perfect safety: Multiply the diameter by 3.1416, or by 3⅐, or by 3.15, or it may be multiplied by 22 and divided by 7, all of the above methods give practically the same results. Another plan which is thoroughly reliable is to lay out the circle full size as shown in diagram Fig. 4. When this method is followed the angle of a square is placed at the center point of the circle and lines drawn to the outer edge of the circle. A straight line is then drawn between the points where the lines from the center touch the circle. The distance between C and D is equal to ⅐ of the distance between A and B and that distance is added to three times the diameter. In all cases it is necessary to add the thickness of the material to be used to the diameter before any figuring is done.

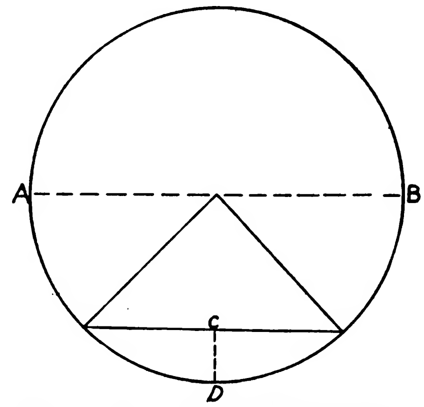


FIG. 4—THE CIRCUMFERENCE OF A DIAMETER IS EASILY FOUND BY THIS METHOD

To Make Hooks In Proportion To Chains

To make hooks in proportion to the weight of a chain, multiply the diameter of the material of which the chain is made by 2½. This gives the correct size of material to use for a hook. After the diameter has been determined, multiply that by 8 which gives the correct length. Example: a chain made from ¾-inch material ¾x2½=1⅞; 1⅞x8=15; thus 15 inches of 1⅞-inch round material is required to make a hook equal in proportion and capacity to a ¾-inch chain.

An Electric Power Shop of South Dakota

R. H. Anderson

I certainly can not get along without "Our Journal." I have read it for a good many years. It is a great help; there are so many ideas that a person cannot help deriving benefit from the journal.

My shop is 26 by 56, one story. We do all kinds of work. I do a lot of engine repairing and everything in that line—put on patches, tip flues and line up engines. We do

THIS ELECTRIC POWER SHOP OF SOUTH DAKOTA IS RUN BY MR. R. H. ANDERSON

mostly plow work in my shop. Of course we shoe horses, but I cater more to plow work as that is my main hold and the farmers around here are beginning to find that out, so I have no trouble in getting my share of this work. Here are some of the prices around here:

Setting four shoes	$ 1.00
Four new shoes	2.00
Wagon Tires, 2-inch	2.50
Wagon Tires, 3-inch	3.00
Sharpen lays	1.00
New 14-inch lays	3.50
New 16-inch lays	4.00
Wagon axles	4.00
Bolsters 2.50 to	3.00

I have heard of some smiths having trouble in hardening lays, the difficulty being in getting them hard and in preventing the lay from springing. I take a common water barrel of soft water to 50 lbs. of salt and 4 lbs. of bi-carbonate of soda. Heat lay to red and immerse in barrel, point first. To keep lay from springing, I use a piece of angle iron, bent to slip over back of lay when it is hot. Bend the angle iron double so the lay will have room enough to slip in between the two sides of the iron. When the share is hot, slip the iron on the back and it will not spring.

I enclose an inside view of my shop. I run the machinery with a five-horsepower Electric Motor, have two fires, one Easy trip hammer, a power drill, an emery stand, two vices, one wood vice and of course other small tools, also two sets of screw plates, ¼ to 1-inch. Collections are slow just now, but will be better later on in the fall. There does not seem to be much cash in circulation now.

Magnet for Removing Filings or Chips

J. N. Bagley

Having a number of holes to drill and tap in a solid block that could not be turned to remove the shavings and chips, I found a magnet a very handy tool. After drilling the hole to the required depth, I procurred a magnet and a cap screw that would slip into the hole perfectly free. After letting the screw to the bottom of the hole, I applied the magnet to the head of the screw. This caused the shavings to cling to it. As soon as the magnet is released the chips and shavings will fall from the screw and the operation can be repeated. In this way we were able to tap the holes with very little trouble. This little kink will probably be valuable to some brother mechanic.

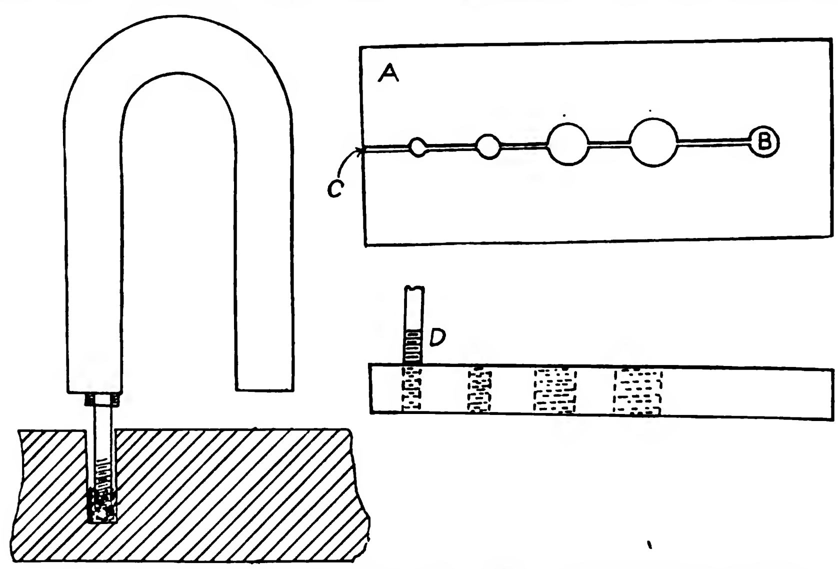
For Holding Stud Bolts While Threading

Having a number of stud bolts to make, I found it quite a task to make the short thread without ruining the thread on the opposite end while holding it in the vice. I made a device in the following way that gives excellent satisfaction. Taking a block of steel A one inch wide by three inches long and one half inch thick, I drilled and tapped a number of different size bolt threads ranging in size from one fourth to one half inch. I then close drilled a quarter-inch hole at B and sawed through from the opposite end with two blades in the hack saw frame. This gives spring sufficient to hold the stud bolt perfectly tight when the device is placed into the vice. At D is shown the manner of placing the stud bolt into the device for threading.

A Nebraska Shop and a Case of Practical Shoes

F. G. Hather

The accompanying engravings show a picture of my shop and a case of shoes. You will notice that the shoes are numbered; I will explain their use. No. 1 in the illustration represents a sideweight and bar combined to widen the action and stop interfering. No. 2 is a toe weight shoe on bottom instead of on top as I believe it will balance a horse better.



A SIMPLE KINK FOR REMOVING CHIPS AND A DEVICE FOR HOLDING STUD BOLTS

No. 3 is a common plate shoe for a trotter or pacer. No. 4 is a side and toe weight for shoe interfering. No. 5 is a front shoe with side weight for interfering. No. 6 is a sideweight shoe for trotters or pacers. No. 7 is a side weight shoe with the rim turned down for cross firing (it doesn't show very well in the picture, No. 8 is a toe weight and bar combined for trotters or pacers. No. 9 is a side-weight with square toe weight on the outside for cross firing. No. 10 is a side weight with trail for interfering. No. 11 is a sideweight with half bar combined. No. 12 is another style of bar shoe for weak quarters or corns. No. 13 is a common bar shoe for trotters or pacers. No 14 is a common frog pressure bar shoe with bar in form of an anvil. No. 15 is a common bar shoe with a round face. No. 16 is a sideweight shoe with trail and a few extra touches to it. No. 17 is a square toe bar shoe for a forger. No. 18 is a common running shoe. No. 19 is a cross firing shoe with a grip on the outside to break horse over straight. No. 20 is a very light sideweight hind shoe for interfering. No. 21 is a front shoe with side weight on the outside for knee knocking. No. 22 is a light bar shoe for a running horse. No. 23 is another style of sideweight shoe for cross firing. No. 24 is a common shoe for trotters or pacers. No. 25 is a front shoe for a hitter or knee knocker. No. 26 is a trotting plate with a trail. No. 27 is a small anvil I made. Now I have shown you all sorts of shoes and no two alike. I made these shoes after my own designs. I have used most of them on horses that had a faulty gait. I do not believe there is a horse that cannot be corrected if you use weight enough and in the right place.

THIS IS MR. F. G. HATHER'S SHOEING SHOP IN NEBRASKA

A CASE OF PRACTICAL SHOES BY MR. F. G. HATHER

Various Ways to Repaint

W. A. Riggleman

If you are living in a part of the country in which the prices are cut to pieces, and you intend trying to stick it out, at least put your shop in order so that you can get out your work quickly and in good condition, and will not find it necessary to "put on extra coats to hide the dirt," as the customers say. I am going to tell you how to do a revarnish job reasonably cheap, and how to do it well. You may try the four following methods if you are in a cheap place, and whether your paint shop is large or small will make little difference.

All the jobs look like tough propositions when they are brought in, and look as if they needed painting, but the customer merely wishes them revarnished. After the vehicle is unhung and ready for work, start on the body, rubbing down the old varnish with fine pumice and water. Clean thoroughly and let it dry. Do not touch up, this time, but give the body a solid coat of black solid covering color varnish. When dry, rub down as before, touch up, if need be, and then finish.

For the gear on this revarnish job, simply sandpaper lightly and apply a coat of solid covering color varnish. You can get any color in this varnish. When this coat is dry, moss, stripe and finish.

For a cheap job of painting, sandpaper the body well and give a coat of rough stuff. When dry, putty a little and, when putty in turn is dry, smooth down a bit with lump pumice stone or, if you wish, sandpaper it. Apply a coat of lamp black and, when this is dry, apply a coat of color varnish. When last coat dries, rub out varnish, and finish. For the gear, sandpaper all over and give a coat of dark lead with camel hair brush. When dry, moss and give a coat of solid covering color varnish. Do not putty.

For a medium job, sandpaper body all over and give it a coat of rough stuff in which there is a great deal of keg white lead. Don't use oil; there isn't time. When this coat is dry, putty or glaze and, when putty in turn is dry, apply four coats of regular rough stuff. When the last coat of rough stuff has become dry, sandpaper lightly and apply a coat of drop black. The next coat is one of regular black varnish. After this dries, rub and finish. For the gear, sandpaper well, give a coat of lead, (tinting lead the color gear is to be) and, when this coat is dry, putty. When the putty has become dry, sandpaper lightly, give gear a coat of the desired color and, when dry, apply a coat of regular color varnish. Moss, stripe and finish.

If you get a good job of painting, or a "first-class job" as it might be called, for which you are to receive a good price, begin by burning off the body. Sandpaper the body well, ap-

ply a coat of lead in which there is a little oil and, when dry, putty. When putty has become dry, sandpaper. Apply five coats of rough stuff and, when dry, rub out. Sandpaper lightly and administer a coat of lamp black. When this has become dry, moss off and give a coat of drop black. Next apply a coat of black varnish. When dry, rub and give a coat of black varnish, half black and half clear varnish. When dry, rub and finish. For the gear, scrape off the old paint, sandpaper well and give a coat of lead. When dry, putty. Sandpaper, when putty is dry, and then apply a coat of dead lead. When this coat has become dry, moss off and give a coat of color. Next apply a coat of color varnish and, when this dries, moss or rub stripe and finish. This method of painting will do for automobiles. Have four methods of painting, and you will surely gain business through one of them.

Mixing Varnishes

Some painters advise mixing varnishes, that is, mixing a slow drying varnish with a quick drying one, so that the work may dry quickly in the winter time. I claim that this will not work well if you mix it yourself as it will dry in spots and will not be uniform. I have done this, for instance, mixed black varnish and gear or body varnish and used it on top irons and old buggy bows, but it did not dry uniformly. Would any body finisher put rubbing varnish in his body varnish to produce a nice job? If he did the rubbing varnish would set and the body varnish would keep flowing out and make a bad job of it. I have used gear varnish on a cheap job of painting on which I did not mind a few brush marks, but on the whole, all painters agree that when they mix varnishes they are taking chances. There are many quick drying varnished now on the market which will do satisfactory work in the winter or on damp days.

Some claim that varnish becomes better as it grows older. If so, why are not the varnishes marked with the date of their manufacture? Some of the varnishes one get these days, must be very young from the way they work. Another thing the makers of varnishes put in all the turpentine the varnish will stand. If you put in more, like some painters do, you spoil it; the luster is killed. Then people say that the varnish is no good—Who made it "no good?" The best varnish made will not stand doctoring, and if you doctor it you have no right to blame the result on to the varnish maker. Any good carriage painter can tell by looking at a varnished job if the varnish has been doctored. Some painters if their varnish becomes a bit thick, put turpentine into it. The best thing to do is to heat it, also heat the bodies and gears to the same temperature. Small shops should buy body varnishes in small cans. If you do this you will have no thick varnish. Use it on small panels. I sometimes use thick body or gear varnish upon shafts and on the gear parts. It is not well to use it on the wheels. There are plenty of places upon which to use all of your varnish, if you will only get out of that old way. Purchase varnish according to your needs. Its best to buy small cans if you use it in small quantities.

AN AUSTRALIAN SHOP RUN BY MR. C. ANDERSON, WHO ALSO MAKES A SPECIALTY OF CASTING BELLS. HE SELLS THEM THROUGHOUT AUSTRALIA

More Roses and Leaves in Iron

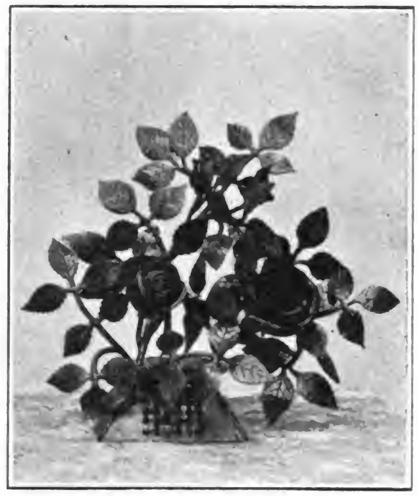
Bert Hillyer

The spray of roses and the stand in the engraving are welded into one piece, there being thirty-two welds in the whole. There was no riveting or brazing done in the joining of them. Neither was there any filing done, but simply hammer and tongs work on the anvil. I have no doubt it would have looked better if it had been filed, but filing takes away the satisfaction of doing clean blacksmithing. I do not mean that a file

A VEHICLE SHOP OF OHIO RUN BY MR. C. C. TINKER

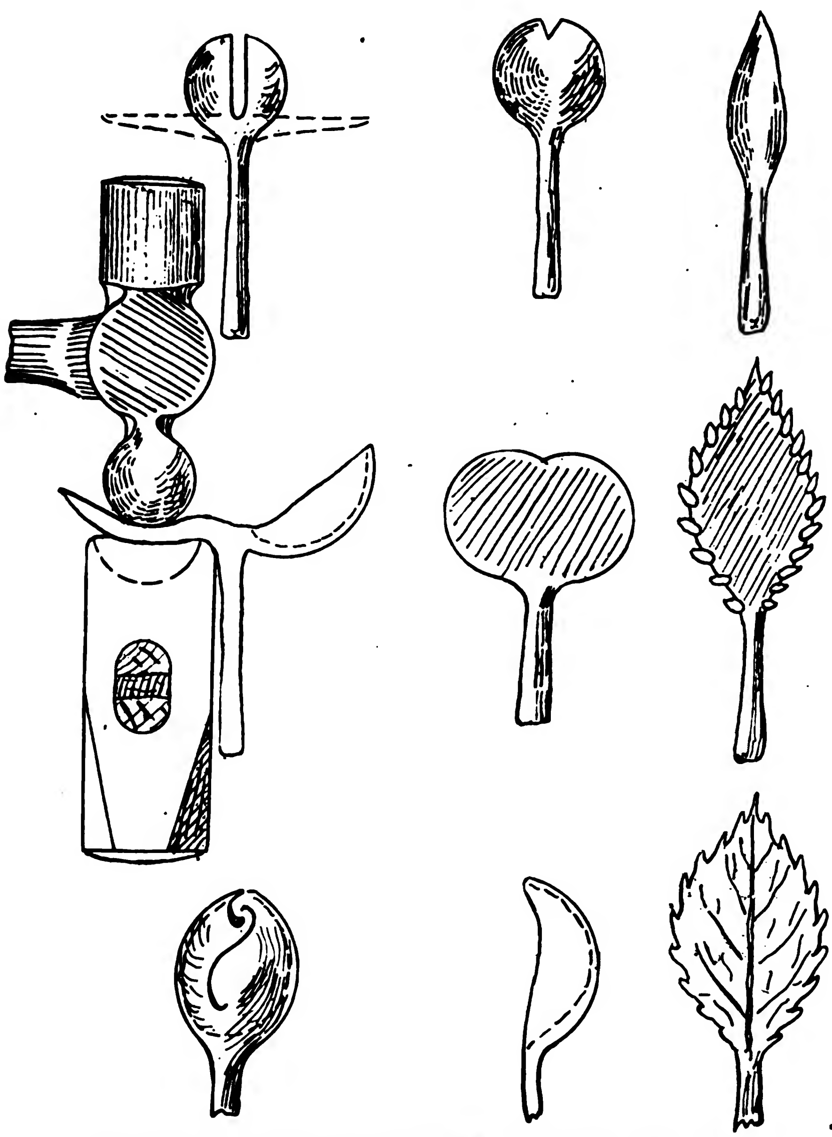
should not be used to scrape off hot scales when forging as that is necessary in order to prevent the scales from pounding into the iron and making the surface look rough.

The leaves in this piece were made of ⅜-inch round soft steel, hammered down to the shape shown and then flattened down very thin. This is all done in one heat. The stem is next cut off about two inches long. A small cold chisel is made and ground blunt on one corner tapering very thin to the other corner. The blunt end is used in punching out the rough edges of the leaf. This is done by placing the leaf on an iron block, putting the blunt edge of the chisel about ⅛-inch from edge of leaf and hitting it with hammer. The veins are made by marking out center one first with chisel, keeping blunt end in center and pointing to the outside of leaf. Another chisel is made with a slight curve and is used on upper part of veins. Three of the leaves are bunched together and welded, the stem of these being drawn out long enough so that two more can be added and welded on and so on until the piece is ready to be welded on to the main stem. The rose part is made by making a round ball with a stem, splitting it down from the top with a thin hot chisel or hack saw and throwing it out in two halves. These are flattened down thin and cupped in a tool that is used for heading rivets. This is done with the ball end of the hammer which drives the metal into the tool, forming two small ladle-like pieces with one stem. These are closed together, but not to form a true ball, but so the edges go inside of one another and are partly rounded on the outside. This can be plainly seen in the smaller rose in the engraving. The other petals are made in a ball the same size as the first and cut with a blunt cold chisel to a very small depth on top. This, when flattened down, forms a heart-shaped piece. These are cuépped in a larger tool, fitted round the first piece and welded. This part requires close attention to result in a good neat job. The bud is made by forging a piece solid in the shape of a bud, cutting it down crosswise with a hack saw, and roughing the point with a thin chisel.



MR. HILLYER'S SPRAY OF ROSES

The engravings show the three different stages of making the rose and leaves. The first row from top to bottom shows the inside petals, the next one of the outside petals and the last row the leaves. It takes ten balls, $\frac{9}{16}$-inch in diameter, flatened cupped and placed one inside of another with stems welded together to make the rose.



THE SEVERAL STEPS IN THE MAKING OF ROSES AND LEAVES

Talks With the Blacksmith on Gasoline Motor Troubles—2

J. N. Bagley

Piston construction as applied to the gas engine may be summed up in the following manner, single acting trunk type. (Meaning by single acting, power or impluse in one direction only.) The portion of the cylinder length covered by the stroke of the piston may be properly called the sweep. The portion of the cylinder which is not swept by the piston is termed the clearance. The valve chambers are so situated as to open directly into the cylinder clearance. The piston used in the gas engine is hollow and within it is fastened the connecting rod by means of the cross head or wrist pin. The piston is so

LOCKS, HINGES AND KEYS OF IRON FROM THE SEVENTEENTH CENTURY.

constructed as to make a very close working fit in the cylinder about .001 inch clearance around. The piston is supplied with rings machined to a perfect working fit in the cylinder. These rings are eccentric or, in other words, the inside bore is eccentric to the outside bore; thus the ring has a certain amount of spring, allowing it to expand to the walls of the cylinder and thereby stopping the gas from escaping past the piston. Piston rings are made from gray cast iron, the thick side being twice the thickness of the thin side. A piece of cast-iron pipe is obtained and secured to the lathe chuck in such a manner that a cutting tool can separate the rings the required width, after which they are placed in a jig and the inside is machined. The rings are cut apart to allow them to pass over the junk rings on the piston. The rings are made larger than the cylinder. A piece from ½ to 1 inch in length is cut out (depending, of course, on the diameter of the cylinder) so that when the ring is pressed together it reduces the diameter of the ring to that of the cylinder and leaves an outward spring to the ring continually pressing against the walls of the cylinder. After a piece of the ring has been cut out and the remaining part pressed together it will make an oblong instead of a perfect ring and, consequently, it will not fit a perfect cylinder. To insure a perfect fit in the cylinder, the rings should be pressed together again and turned to a perfect ring at least on the outside. The inside does not matter so much.

The piston pin or gudgeon pin connecting the piston and the pitman is subjected to considerable strain, probably to more than any other part of the motor, considering the size of the pin. Much care should be exercised to keep the pin adjusted to a correct working fit and see to the proper lubrication of it. Many times a very ugly knock is caused by a worn or broken wrist pin. The crank or wrist pin should be so constructed that the strain per square inch is not more than 400 lbs. average pressure. Builders in general agree that the size of the pin should be from one to one and a fourth times that of the shaft.

Worn piston rings cause a loss of compression and that means loss of power by allowing the escape of the cylinder. Worn piston rings can only be repaired by replacing with new rings. Loose or broken rings cause knocking or pounding in the cylinder and should be cared for as soon as discovered. If in the case

A BUSY GENERAL SHOP IN OHIO RUN BY MR. W. H. EVANS

of a broken ring a new one is not at hand the old one should be removed and engine allowed to run minus the ring. Piston rings that have become displaced or, in other words, have worked around so as to allow all the slots to be in direct line with each other are another cause of lost power. The remedy is to remove the piston and replace the rings in their proper position.

The crank shaft is one of the most important points to be considered in the design and construction of the gas engine. The center line of the wrist pin should be exactly parallel with the center line of the crank shaft, as the least variation would result in a bad running engine. The arms of the crank shaft should be of exactly the same thickness, so as to bring the wrist pin in such position that the center line of the cylinder will divide into two exact halves in every part of the entire length of its stroke. The crank shaft of the gasoline engine must be made with strength sufficient to withstand the sudden pressure due to the regular explosions as well as the irregular explosions to which all gas engines are subject more or less. Therefore, the crank shaft must be constructed in proportion to the area of the cylinder as well as the pressure of the explosion. If the crank shaft has not sufficient strength to withstand the sudden pressure without springing at each explosion or impluse of the motor the bearings could not be kept tight and true and the fly wheel would run out of true, or at least it would appear so, owing to the shaft springing at the ends. Balancing the crank shaft is one of the most important features to be considered in crank-shaft construction. The single cylinder crank shaft cannot be balanced perfectly; therefore, most engine manufacturers merely balance their engines as far as the working parts are concerned. Many manufacturers prefer balancing the engine by the means of a small recess in the rim of the fly wheel, as this method has the advantage of requiring no more metal and is a great deal cheaper than balancing with the counter weights on the crank shaft. In either of these methods, the fly wheel itself is not balanced, and as the wheel is rotated the shaft appears out of true.

Advertising the Shop

If you want more business—and who does not?—you'll be very much interested in our calendar announcement for 1912. Our calendar painting this season is very beautiful and you will want some calendars to advertise your own business.

A GENERAL SHOP OF VICTORIA, AUSTRALIA, RUN BY MR. J. BYRNES

Benton and the Editor were chatting about some changes contemplated for "Our Journal" when Tom Eaton came in.

"Hello! Mr. Editor and Benton," greeted the newcomer. "I thought I'd stop in for a few minutes and see if you men could give me any information on something that's been puzzling me and my men for some little time. We've been using a lead bath at the shop for several weeks and, as is generally the case, we've run into several problems. The only one we've been unable to solve so far is to prevent the lead from sticking to the work. We've tried several receipts and formulas but they don't work at all in some cases, and others work fairly well at times and then not at all."

"What have you used?" questioned the Editor.

"Well, I got hold of a number of formulas," began Eaton. "I started with the simpler ones first and went down the list without getting what I was after. The first thing I used was salt brine; then I used a paste of wet salt. I found that the trouble with the wet paste, such as salt, flour and meal pastes was that you had to wait until they were perfectly dry. If you plunged your stock while the paste was wet or damp the lead is likely to spatter. You see, the moisture in the paste when touched by the melted lead turns it (the moisture) into steam so quickly that the lead spatters and becomes dangerous."

"Have you tried a mixture of salt and cyanide on the surface of the bath?" asked the Editor.

"Yes, we tried that but results were not uniform. For example, after several pieces were dipped the mixture on the surface of the lead would, of course, be less, and if the operator didn't add more salt and cyanide every little while his work would not be properly coated. What I want is something that the operator must use—something he can't forget to use—something that will give uniformly good results, and the way Benton has kept quiet all the time I think he's got something worth telling about."

"Well, if that's a call for me to talk I want to say that I was just thinking how fortunate it is that I went down to see Charley Foster at the Hester-Mark Works last week. Charley told me he had trouble with his lead bath for a long time. After experimenting for several months he hit upon a mixture of whiting and alcohol. He takes common whiting and adds enough wood alcohol to make it about paint consistency. This he applies to the work and he says it is the best thing he knows for preventing lead sticking to the work."

"That may be so, Benton," returned Eaton, "but the operator must wait for his work to dry, and if he plunges the work before the paste is thoroughly dry he is likely to get burned."

"This mixture dries very quickly," replied Benton. "You see, that's why alcohol is used; and then, too, when many pieces are to be plunged into the lead bath, one man paints the articles and has a lot of them ready and waiting for the hardener. In this way the work goes right along without a hitch. Naturally, of course, the hardener does not dip those pieces not painted and the work will come out uniform for the lead cannot stick to any metal covered with the whiting."

"Well, that seems to be the proper thing, Benton, and I will certainly try it. I am very glad I stopped in," and with a hearty "thank you" Eaton went out.

The Passing of the Country Smith

J. KENDALL.

Having read Mr. George Cormack's able article in your January issue on "The Passing of the Old Time Country Blacksmith in Europe," I can endorse all he says so far as the north of England is concerned. Within thirty miles of where I reside I could point out the sites or ruins of thirty-four blacksmith shops, many of which, twenty or thirty years ago, were busy centers of industry. On passing one of them the other day I felt tempted to have a look inside. All was silent except for the murmuring of a river a few yards away, and on leaving the place I wrote the following verse:

Beneath the leafless beeches
The ruined smithy stands.
It's tenant gone, perhaps to roam
In this or foreign lands.

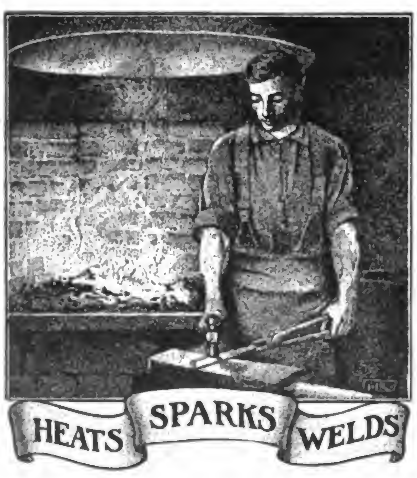
The earthen floor a puddle,
The hearth with cinders spread;
The crickets ne'er a chirrup give,
All else around is dead.

No more I hear the bellows—
Nor hear the anvil's ring—
Nor see the fiery sparks that fly
Like shells at Mafeking.

The smith has left his forge—
For times have changed his trade.
No work had he except to shoe,
Or fit a mower blade.

The time seems not far off
When few will use a cart.
The motor car has come to stay,
To take the horse's part.

And youngsters of the future
Will visit at the zoo
Before they find a horse or mule,
There'll be so very few.



It's his service to the world that makes one man superior to another.

Don't let the grindstone hang in the water when not in use. It makes the stone soft.

You kill two birds with one stone every time you kill time, for character is killed, too.

The true stories of why men succeed can never be told. The true reason lies within each individual.

What is not in the gasoline tank cannot come out of it. Remember this when next your engine balks.

Don't depend too much on your location or your established trade to make your business a success—Dig in!

How's the garden getting on? Try mixing anvil sweepings and iron filings with the soil; both are good for the plants.

You never find him fixing up tools just before starting on a job. No, Sir, the up-to-date smith keeps his tools in order and readiness ALWAYS.

We're trying hard to please just as many people as we can. And you can help us by letting us have your ideas on what you want to see in the paper.

Uncle Billy Martin says: "This here ole world is so dad much better than some folks deserve that they don't seem to realize how blamed good it is."

Some men are born good and some are made good by their wives, but Tom Tardy doesn't come under either of these heads—seems to be good-for-nothing.

You can no more sit down when your business has made good than you can stop the blast in your forge and expect your fire to go right on heating iron for the rest of the day.

Do you know a smith who does not know THE AMERICAN BLACKSMITH? Let us have his name on a postal. You will help him and help us, too, by sending in his name and address.

Make the shoes light these hot days. It's bad enough to work a horse at all in the heat of the day without requiring him to lift an unreasonable amount of metal at each step.

Quite a factor in these days of hustle and competition is the well arranged, well equipped shop. How does your shop compare with those pictured in this issue?—our annual shop number.

A dollar won't buy as much today as it did five or ten years ago; still you continue to charge the same old prices and think you make the same old profit. You can't continue long on that system.

Surely you can think of some different ways to advertise your business. Don't follow in the footsteps of your competitors. Do it a little out of the ordinary and regular way. But do it—do advertise.

Better by far to attempt ten things and fail than to never do anything at all. The right kind of man profits and learns by his mistakes as well as his successes, and each attempt makes him stronger for his effort.

A good machinist and man on automobile work will find an opening in the South by communicating with Mr. A. H. Lea, of Crystal Springs, Mississippi. Must be good, sober, all-around man for general repair shop.

A cut price for blacksmith work means either poor goods or poor salesmanship. When you cut prices you admit one or the other. Good work and good goods, rightly demonstrated, will always claim and get just returns.

The shoer can do much toward relieving the sufferings of the horses that enter his shop; and he can do this not alone by shoeing them properly, but by dropping a hint now and then to owners about abuses and ill-treatment.

Do you save the trade catalogs that come in your mail? They are books you cannot afford to throw away. Save them and in proper order; then you'll know where to get what and at what price. Again we emphasize—file your catalogs.

Only two real ways are there of increasing profits—by a cut in costs or a raise in selling price. Any other cut or advance lowers your profit. Yet some smiths seem to think that a cut in selling prices is a cut at costs—instead it is a cut at profits.

Have you solved the side-line question? You'll find a goodly batch of suggestions in our advertising pages. Better pick out one or two lines to handle between busy hours. And don't forget automobile lines are especially suitable for the smith shop.

Do you want an apprentice? We know of a 17-year-old boy who desires to learn blacksmithing. This young fellow is 5 feet 3½ inches tall and weighs 140 pounds. If you want an apprentice and can teach him the trade thoroughly write to The Editor.

We cannot, of course, all be leaders, but there is no reason on earth why we should not and cannot try. We cannot all have the best equipped shop, the biggest business or the best trade, but we certainly cannot be excused from trying for these things.

"Our Folks" will regret to learn of the death of Mr. L. Van Dorin, a contributor to these columns since the beginning and a man prominently identified with the trade. Mr. Van Dorin originated several devices now much used by vehicle builders and repairmen.

Get right down to figures if you think you are making a profit at present prices. There's nothing more convincing than actual figures in a profit and loss argument; and if you think you are making a profit figures will quickly show you whether or not you are correct.

Have you sent in that new subscriber? Why not get busy today and do your part toward a still bigger, better and more valuable journal? If we can give you a better paper you want it. We want to give you a better paper and can—with your help. And all we ask is that you get one new subscriber. If you and every other reader did this we would be able to count twice as far as now in counting "Our Folks."

The first newspaper advertisement published in America appeared on May 1st, 1704, and, curiously enough, was for anvils. The ad read as follows: "Lost, on the 10th of April last off Mr. Shippens's wharf in Boston, two iron anvils weighing between 120 and 140 pounds each. Whoever has taken them up and will bring or give true intelligence of them to John Campbell, Postmaster, shall have a sufficient reward."

A Pennsylvania reader—Mr. George M. Schermerhorn—sends in the following riddle:

O'er rocks and hills and dales I go,
Through brooks and vales and drifts of snow.
When battle rages I am there,
Me from my duty none can scare.
My power all nations now will own,
From beggar upward to the throne.
Men often ride o'er me to fame—
So now begin to guess my name.
I'm meek and lowly you will find,
But still I own that I am blind.
In a hard place I make my bed,
And always stand upon my head.

Of course you have guessed the answer to be a horseshoe nail.

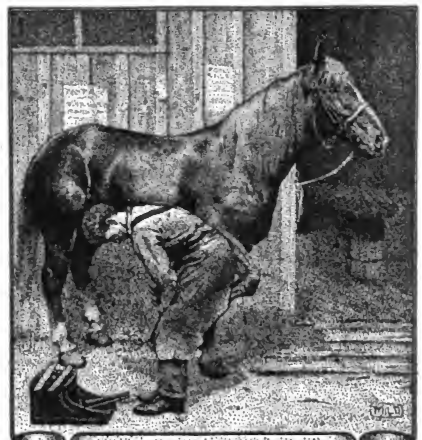
Our Honor Roll

This feature of "Our Journal" is proving of more and more interest each month. "Our Folks" seem to like this method of showing our appreciation of their loyalty. Have you noticed the number of subscribers in Australia whose names are to be found on this list? You will also notice that Mr. Crisler still holds first place by a good margin. Who has the grit to displace him? Our long-time rates make a position on the Honor Roll easy. Here they are:

	U. S. and Mexico.	Canada.	Other Countries.
Two years	$1.60	$2.40	10 shillings.
Three years	2.00	3.40	14 shillings.
Four years	2.50	4.35	18 shillings.
Five years	3.00	4.90	1 Pound.

And when you ask a neighbor to subscribe show him this list. A paper with such a list must be valuable and practical.

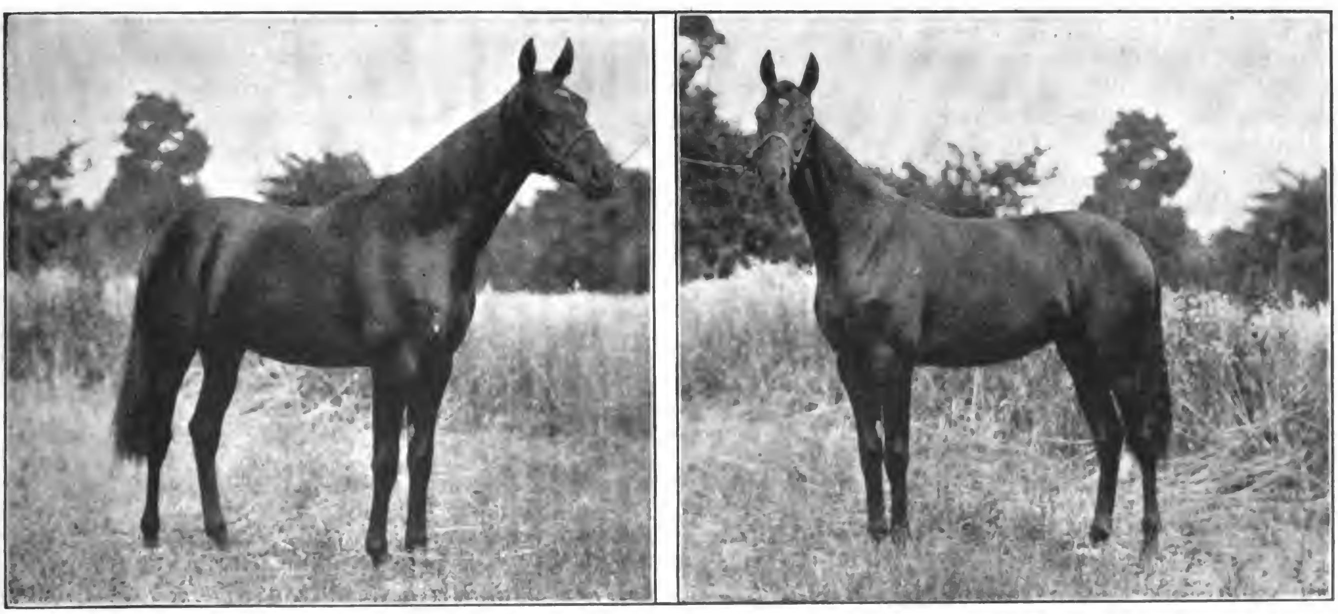
R. S. Crisler, Kentucky....... Jan., 1920
T. P. Considine, Massachusetts. Dec., 1918
Richard Brenner, Texas........ Feb., 1918
C. J. Hall, Washington........ Dec., 1916
Geo. P. MacIntyre, Maine.... July, 1916
Chester Humbert, Wisconsin.. June, 1916
Lincoln Underhill, California.. June, 1916
M. Broton, North Dakota...... June, 1916
C. H. Cairns, New York........ May, 1916
P. V. Johnson, Ohio........... May, 1916
D. E. McDonald, Florida...... April, 1916
James Baxter, South Africa... April, 1916
E. P. Dignan, South Australia.. April, 1916
W. H. Winget, Vermont...... April, 1916
George Howard, Kansas..... March, 1916
G. N. Follmar, Nebraska..... March, 1916
W. Willoughby, Michigan.... March, 1916
H. Hoffmeyer, New Jersey.... March, 1916
Frank L. Locke, New York... March, 1916
Frank L. Evarts, Connecticut. March, 1916
C. R. Winget, Vermont..... March, 1916
Hugh & John Chisholm, N. Z.. March, 1916
E. P. Jones, Kansas........... Feb., 1916
A. Tillman, California......... Feb., 1916
C. K. Cornelison, Pennsylvania. Feb., 1916
M. Klitgord, New York...... Jan., 1916
O. Stenning, South Dakota...... Jan., 1916
Iver Johnson Arms and Cycle Works, Massachusetts....... Jan., 1916
Feldmeyer & Schaake, Kansas.. Jan., 1916
Jas. A. Sharp, Massachusetts... Dec., 1915
J. Krahulec, Illinois.......... Dec., 1915
P. E. Dahlfurst, California.... Dec., 1915
Wm. Bisher, Ohio............ Dec., 1915
C. A. Jerner, Nebraska....... Dec., 1915
G. S. Fisher, Nebraska....... Dec., 1915
Printers Supply Company, Nebraska.................. Dec., 1915
M. Kennedy, Tasmania....... Dec., 1915
Williams & Turner, W. Virginia. Dec., 1915
C. J. Ash, Kansas............ Dec., 1915
F. H. Joslin, Massachusetts..... Dec., 1915
C. W. Ames, Massachusetts..... Dec., 1915
C. L. Sorensen, Nebraska....... Dec., 1915
E. Williams, New York...... Dec., 1915
W. Urquhart, New Zealand...... Dec., 1915
W. Rupe, Oklahoma.......... Dec., 1915
L. S. Kocher, Iowa........... Dec., 1915
D. Codere, Illinois............ Nov., 1915
F S. Woody, Iowa........... Nov., 1915
George H. Ilsley, Massachusetts. Nov., 1915
M. I. Huff, Missouri.......... Nov., 1915
Stephen Wachter, Pennsylvania. Nov., 1915
C. C. Perry, Australia......... Oct., 1915
Sidney Stevens Imp. Co., Utah.. Oct., 1915
W. H. Findlay, New Zealand.... Oct., 1915
R. F. Watson, California....... Oct., 1915
H. R. Stone, Connecticut...... Oct., 1915
F. Teuber, Georgia........... Oct., 1915
Ed. Hammill, California....... Sept., 1915
R. D. Simkins, Pennsylvania... Sept., 1915
T. J. Reynolds, Pennsylvania.. Sept., 1915
Wm. Bates, Texas............ Sept., 1915
J. Knight, England........... Sept., 1915
A. Chargois, Queensland, Aus... Aug., 1915
A. M. Byfield, West Australia... Aug., 1915
C. E. Allen, Nebraska.......... Aug., 1915
M. J. Roder, Montana........ Aug., 1915
J. E. Lyon, Texas............ Aug., 1915
F. W. Krenz, California....... Aug., 1915
Jos. P. Rotolinski, Massachusetts. Aug. 1915
Jas. A. Buchner, Michigan..... July, 1915
G. N. Ferree, Utah........... July, 1915
T. O. Chittenden, New Zealand.. July, 1915
The Goldfields Diamond Drilling.. Company, Australia......... July, 1915
J. A. Lawton & Sons, South Australia .... July, 1915
I. Murray, South Australia.... July, 1915
J. W. Ivil, Utah............. June, 1915
E. L. Herving, Florida......... June, 1915
E. E. Mercer, Kansas.......... May, 1915
W. F. Helmecke, Texas......... May, 1915
A. E. Spangbery, Oregon....... May, 1915
J. P. Chiappa, Bermuda...... April, 1915
W. Whitbread, South Australia. April, 1915
J. L. Steelman, Washington.... April, 1915
R. E. Pethrick, Pennsylvania.. April, 1915
Wm. McCurdy, Oregon...... April, 1915
Chas. Schmidt, South Dakota.. April, 1915
Arthur Seewald, Illinois....... April, 1915
T. E. Birchmore, Georgia..... March, 1915
L. D. Campbell, Iowa....... March, 1915
Jos. Hiemenz, Minnesota..... March, 1915
John L. Schulte, Missouri.... March, 1915
Z. M. Wesley, Missouri...... March, 1915
Wm. P. Schrink, Montana.... March, 1915
C. Vogel, Nebraska......... March, 1915
F. Townsend, New Jersey... March, 1915
C. D. Camp, New York....... March, 1915
A. Thalmann, Tennessee..... March, 1915
J. J. Purinton, Ohio........ March, 1915
W. H. Leonhard, Penna...... March, 1915
W. A. Shive, Pennsylvania... March, 1915
R. L. Killingsworth, Texas... March, 1915

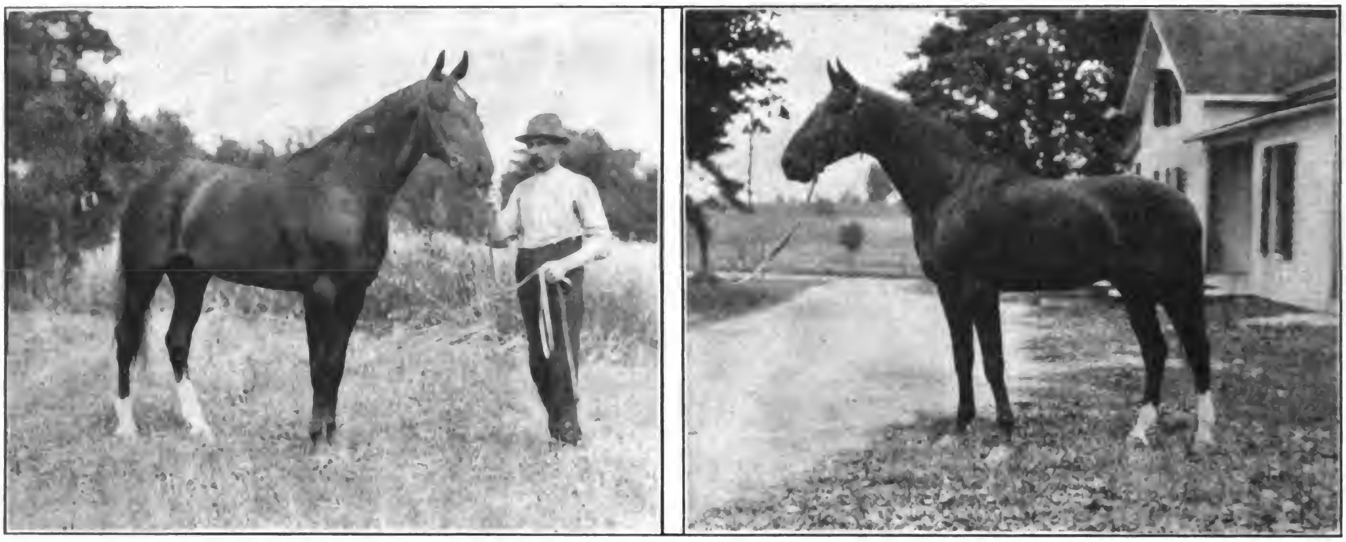

THE HORSESHOER

Shoeing the Horse for Interfering

C. H. GILDER

Mr. Schneider says "to pare the foot about ¼-inch lower on the outside." Mr. Metcalf says that is a new one on him. It seems funny he never heard that before; it is not a

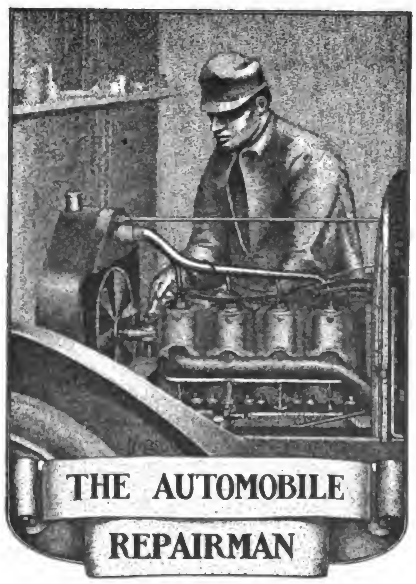

TWO HIGH CLASS AMERICAN TROTTING MARES—DAUGHTERS OF THE FAMOUS "DIRECT HAL"



TWO FAMOUS AMERICAN TROTTERS—THE FIRST ANIMAL IS FROM THE FAMOUS "HAL" FAMILY; THE SECOND IS "PRINCE IDEAL"

new one to me. I have read of it and have seen it done by a good many shoers. I have done it myself a good many times within the last twenty years with excellent success in nine cases out of ten and without I think, causing injury or suffering to the animal. Just take a colt who has never been shod, or a horse whose shoes are worn out and you will find that in nine cases out of ten the foot is 1/8 to 1/2 an inch lower on the outside. That seems to be the most natural way for them to travel. Mr. Metcalf says that if you are going to remedy the defect you must break over the inner toe if it is natural for a horse to break over the outer toe. I think he will punish the animal a great deal more than some of the "Hayseeds" to whom he referred. I, for one, would like to have him explain how he breaks over the inner toe, keeps the foot level and keeps his center alignment at the same time. He says: "By paring the outside, you make him travel closer." I do not agree with him. I think the lower you pare the outside, the more you throw his ankles apart.

This is the way I shoe a horse for interfering: I lower the outside as much as I think is necessary and toe him in, that is, if he is a bad one. I take all I can off the outside toe and make the inside as straight as I can. When I get him going alright, I commence to get his foot in shape, and as a rule I don't have much trouble with any of them. I find the owner of the horse doesn't care how you shoe him, as long as you keep him from interfering. He doesn't seem to care whether he breaks over the inner or outer toe as long as it does the business. There is more than one way of doing things, and if I were Mr. Boyes, I would try the way that looks the best to me, and if that did not work, try the other. If he lowers the outside 1/4-inch, I will guarantee that he will not punish the animal in the least.



Broken and Bent Crank Shafts, and How to Repair Them

J. N. Bagley

It often happens that a crank shaft is broken, or badly bent and in either case the problem is a difficult one to deal with. Of course, if the crank is broken, nothing can be done but replace it with a new one as soon as possible, while if it is sprung or twisted it may be straightened. But only a really good man should tackle a job of this kind. A crank shaft that is badly bent or twisted will render the engine absolutely useless but many times the shaft gets slightly distorted without being sufficiently bad to disable the engine. Such a shaft may look perfect to the eye but at the same time be in such a crooked condition as to ruin the bearings of the motor. In case the crank is slightly sprung, it can be detected by the use of the lathe or by a surface gauge on a surface table. Generally a sprung shaft will cause one or more of the crank bearings to become hot after the engine has run a little while. When the motor is taken down on account of the crank bearings heating, a careful examination should be made of the crank shaft to make sure that it is not sprung at some point.

Such distortion as shown at E in Fig. 1. will cause a sudden seizing of the bearings or in more agravated cases a sudden stoppage of the engine, such as would happen when the connecting rod comes down and is driven through the case by the crank shaft. Therefore, as soon as there seems to be a loss of power and the crank bearings become hot the motor should be taken down and an examination made of the shaft.

Another point which we should always bear in mind is that a ductile steel may twist in the length of the journal next to the fly wheel without throwing any of its other parts out of true. I have known cranks to be

in this condition that have never had a connecting rod down. If the fly wheel is a little heavy and the engine is allowed to preignite, it will cause an unnecessary amount of strain on the shaft. As the fly wheel is rapidly revolving in one direction, the explosion of the gas occurs in the combustion chamber of the motor when the piston has only begun to make compression, the pressure on the piston head is in the opposite direction to the travel of the fly wheel and for this reason a shaft is twisted as shown in Fig. 2. A crank shaft may be sprung as shown in Fig. 2 and at the

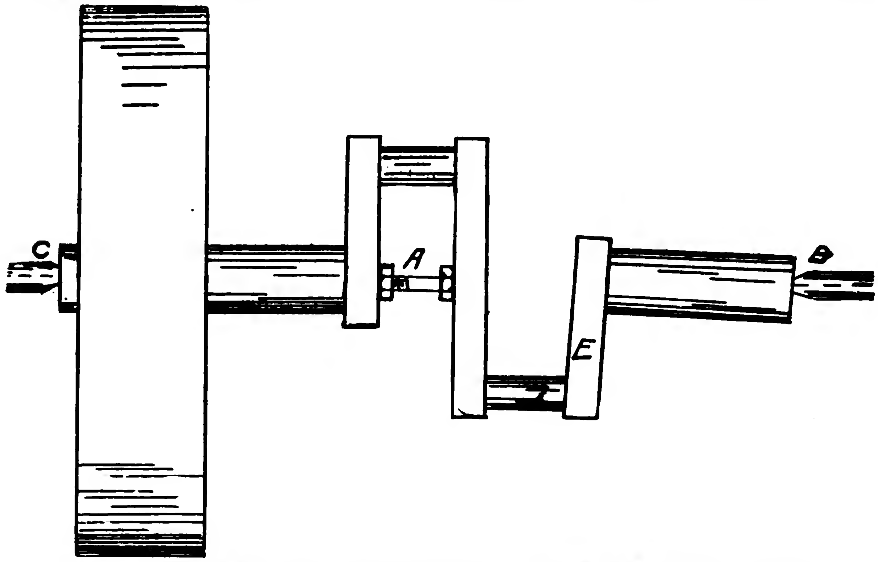


FIG. 1—A CRANK SHAFT DISTORTED IN THIS MANNER WILL CAUSE SEIZING OF THE BEARINGS

same time not cause the crank bearings to heat. The cranks made of the steel to which I refer was used in some of the earlier engines, but occasionally one of those old engines happens in for repair. Cranks twisted as shown in Fig. 2 will many times not effect the bearings, but if not, they effect the power of the engine as the cams cannot operate the valves in correct time with the cranks in

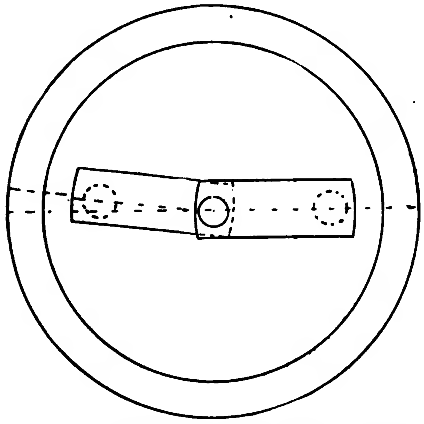


FIG. 2—A CRANK SHAFT MAY SPRING IN THIS MANNER

this position. With one of the cranks firing at dead center, the other would fire when the working stroke was partly exhausted, of course with a single cylinder this could be overcome to an extent by changing the gears to cause the valves to open to correspond with the twist of the shaft.

To true up a crank shaft, whether twisted or sprung is a long way from being an easy job, and many good engineers consider it by far the cheapest to scrap it and replace with new. But many times the engine is needed very badly and the old shaft can be repaired until a new one can be had from the factory. In endeavoring to true up a crank shaft, it might happen that the job could be done at once and again, it might take days and the job be a failure. But in no case should an unexperienced man undertake such a task.

The first thing to do after locating the error is to heat the shaft sufficiently to spring it without, however, destroying the bright surface. In case the shaft is both sprung and twisted take out the twist first as shown in Fig. 4. Heat the shaft until it can be sprung at the desired point and place it in the vice as shown and by placing a wrench as shown in the cut the crank may be twisted back with little trouble. Continue this until both the crank webs remain in the same plane with each other. As soon as the twist has been removed it will be necessary to remove the spring as shown at E in Fig. 1. If one of the webs is true, place a bolt and nut as shown at A, and back the nut just enough to take up the slack.

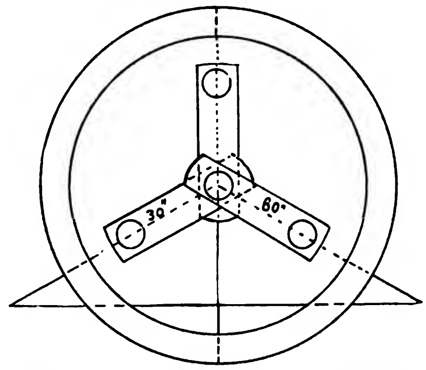


FIG. 3—THE ANGLES OF A THREE-THROW SHAFT

Place the crank in the fire and heat where sprung, after which place it in the lathe between the centers and by screwing up the center in the tail stock the web may be sprung to its place with little difficulty. In case the webs have been sprung inward instead of outward, they may be sprung to their place with the bolt and nut as shown at A in Fig. 1.

A simple bend is a comparatively easy matter to correct in the manner just described, but, when the shaft has been twisted, so that the crank pins are out of their correct relative position as shown in Fig. 2, the job is not so easy and care should be taken that one twist is not put in when one is taken out.

In testing a crank for twist, it should be laid in the V blocks on the surface table with the webs horizontally, and try the crank pins and main journals with the hook point of the surface gauge. In engines of two or

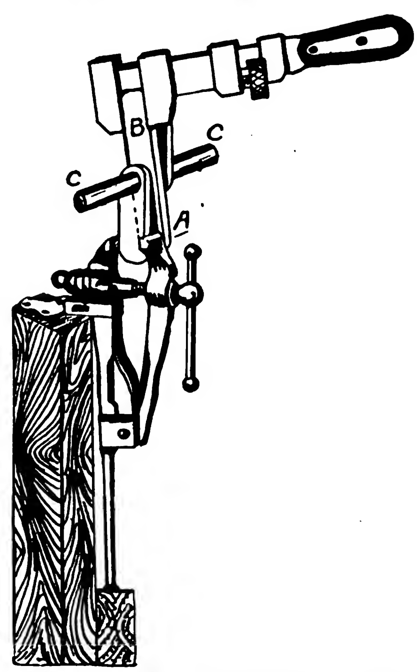


FIG. 4—HOW TO STRAIGHTEN A BENT CRANK SHAFT

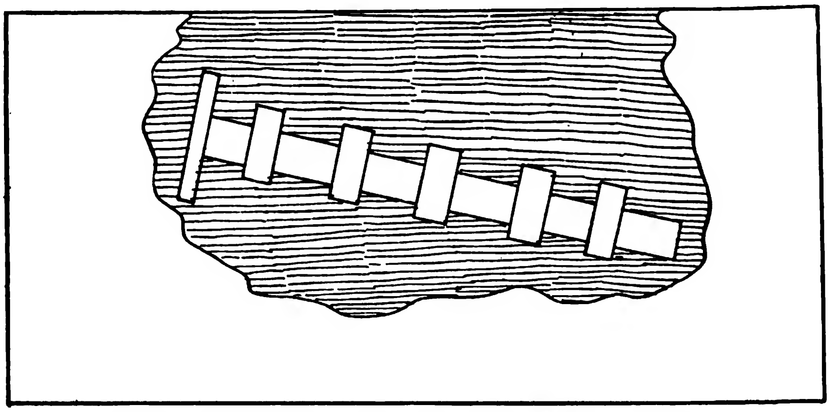


FIG. 1—THE SHAFT WILL NOT REMAIN STRAIGHT IF QUENCHED CARELESSLY

four cylinders this will at once show which piston is at fault, and to what extent, but with a three and six cylinder shaft as shown in Fig. 3, it will be necessary to use a protracter. In every case the main bearings should be brought true before attempting to true the webs.

If one wishes to test a three-throw crank shaft, it should be placed in the V blocks, as in the two or four, and set one of the crank pins level with the main bearings. Now with the surface gauge the center line along the outside web can be marked. Now by measuring the length of the crank along the web and making a

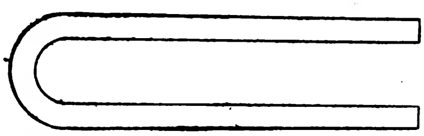


FIG. 2—THE FORK FOR HOLDING THE SHAFT

line at right angles to the first by means of a square from the table, and putting a small center dab where they cross a starting point may be obtained. Now by turning the cranks and repeating the operation the other pins may be tested. Now set one of the center lines of one of the cranks in a verticle plane with the other two cranks pointing downward. At this time the protractor may be applied to the center lines of the other two webs, and one can readily see whether or not the relative angles of the remaining two are correct. Fig. 3 shows this correct and clearly and, as crank angles of a three throw are 120 degrees it will be seen that the angle on the protractor should be 30 degrees. We mean by this that, with one throw vertical, the other two will be, if correct, at an angle of 60 degrees with the verticle or 30 degrees with the horizontal. In case the crank shaft is of the six throw one should proceed exactly as with the three as the operation will be identically the same. In case the shaft has to be heated hot enough to destroy the bright finish it may be covered with dampened corn meal and salt.

Solid Cam Shafts

WHAT TO DO AND WHAT NOT TO DO

J .F. SALLOWS

What we mean by a solid cam shaft is a drop shaft forged with cams complete. The greatest trouble with this kind of job is to keep it from warping, or to straighten it after hardening so as to be in shape to grind. This is quite a trick if care is not taken. If the shafts are annealed before machining, it helps some to remove all strains and get a uniform structure. Some pack this class of work in gas pipe; this is absolutely wrong. In this way the shafts are bent while trying to take them from the pipe while hot. This is where a great deal of the warping takes place with nearly all delicate pieces. They are handled altogether too carelessly. I had trouble at one time with a certain kind of ring going out of shape in the hardening operation; the rings were $\frac{3}{16}$-inch thick and 7½ inches in diameter outside, 5¼ inches inside diameter. We carbonized them about $\frac{1}{32}$-inch deep, and always reheated them. On investigation, it was found the hardener was using a pair of tongs to remove rings from reheating box, and warped the rings in trying to get a hold of them. When given a slender hook and told to use a little caution no more rings were warped in the hardening operation. Previous to this, it was the opinion of all, that the trouble took place in the bath, the rings being hung on a rod suspended in the bath for this purpose.

The best place to pack cam shafts for carbonizing is in a box of suitable length and width to allow plenty of space between shafts. Then when removing from box while hot use a pair of pickups in each hand, one at each end of shaft, and lift shaft carefully from box instead of putting carelessly into bath as shown in Fig. 1. We cannot expect to keep anything straight if thrown in the water

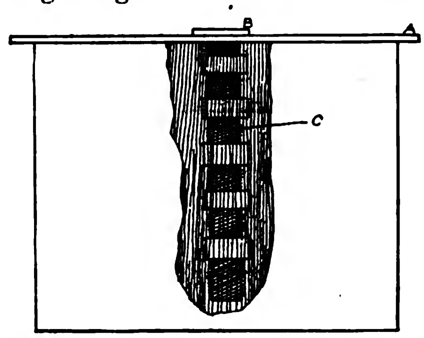


FIG. 3—THE CORRECT METHOD OF QUENCHING

in this manner; but this is about as much caution as some use in the hardening department today.

If a cooled tank is used as shown on page 148 of the March issue, use a device made as follows: Bend a piece of square steel of the proper length and size into a U-shape, see Fig. 2. This same piece is shown at A, Fig. 3. The U-shaped piece is placed across the tank and when the cam shaft is taken from box, the U-shaped piece is slid under the head of the shaft and the shaft lowered carefully into the salt water. In this way, they will keep straight or reasonably so. In Fig. 4 we show how to prepare the solid cam shaft

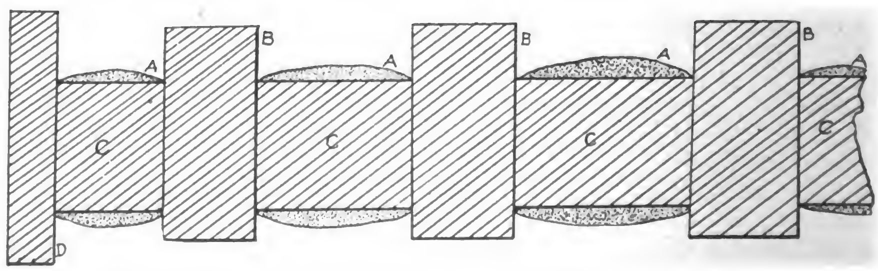


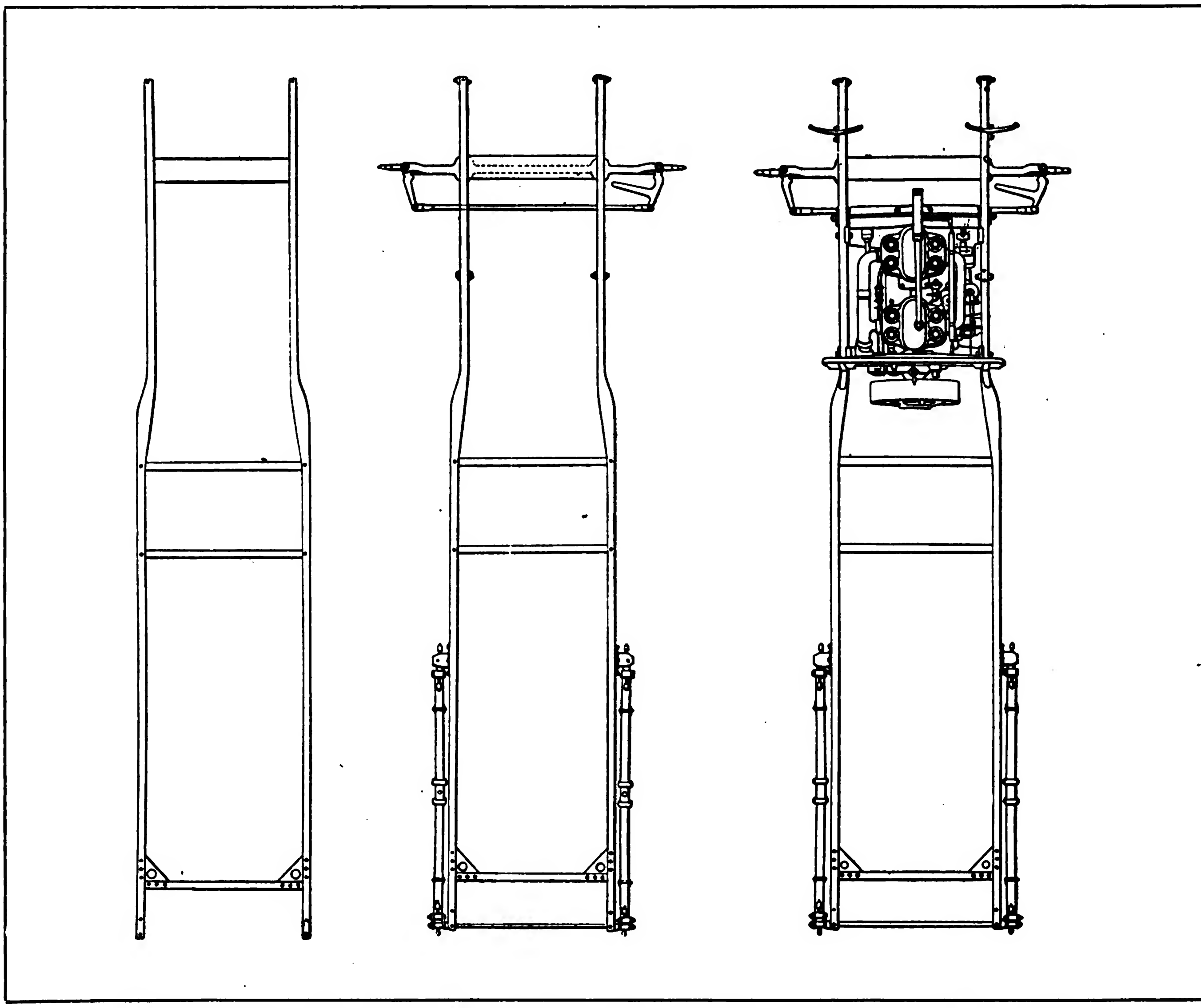
FIG. 4—HOW THE SHAFT IS PREPARED FOR CARBONIZING

before packing in box for carbonizing: A is fire-clay, B is cam, C is shaft, and D is head of shaft, shown at B in Fig. 3. Now if a paste of fire-clay is prepared and a coating about ¼-inch thick, put all around the shaft between the cams and left there until shaft is taken from water after hardening, it will be soft all over except at the cams and can be easily straightened for grinding.

The writer is at the present time testing out different carbonizing agents and experimenting as to the number of times they can be used to advantage. He will give the readers of The American Blacksmith the benefit of his experience in a future issue of the journal. Any readers having difficulty in treating or handling steel either in the forge or in the hardening room are invited to ask qustions. Describe your case fully.

Assembling and Taking Down an Automobile Chassis

Many persons have wondered in what order the components of a high grade, modern motor car are added to the chassis; in fact, letters from readers frequently have reference to this. Aside from the addition to general knowledge of good factory practise, this information for any one car would be useful in overhauling, repairing or in any way working on the mechanism of this or similar makes, because the overhauling work can be done in exactly the reverse direction to the assembling. Thus, the parts which went on correctly should come off in the reverse manner and easily.


FIRST STEPS IN ASSEMBLING AN AUTOMOBILE: FIG. 1 SHOWS THE BARE FRAME; FIG. 2 WITH THE SPRINGS AND FRONT AXLE ADDED; FIG. 3 WITH ENGINE AND DASH IN PLACE

If the rear axle, for instance, is placed on the chassis frame nearly last, being preceded by the transmission and universal joint, and followed by the main driving shaft it will be the best plan in overhauling the car to reverse this, taking off the drive shaft first, next the axle, then the universal joint and gearset. Then too, there are certain methods of procedure which are recognized as good practise and others which are not even by those unfamiliar with actual factory processes. This makes, it a matter of interest to follow some one design through from start to finish.

For this purpose the four-cylinder Locomobile made by the Locomobile Company of America at Bridgeport, Conn., was selected by The Automobile Journal and a series of illustrations secured from the firm showing the work in ten successive steps

from the bare frame to the completed chassis. These orderly and progressive operations will be described in the rotation in which they come.

Thus, the frame alone, shown in Fig. 1, is characterized by great strength, the extra width and depth of metal at the narrowed front end insuring this as well as the many stout cross members. The necked front permits of short turning with a long wheelbase. The material is pressed alloy steel, heat treated, as are the cross members and gussets. Rivet holes are drilled and reamed, while all rivets are applied hot and later tested.

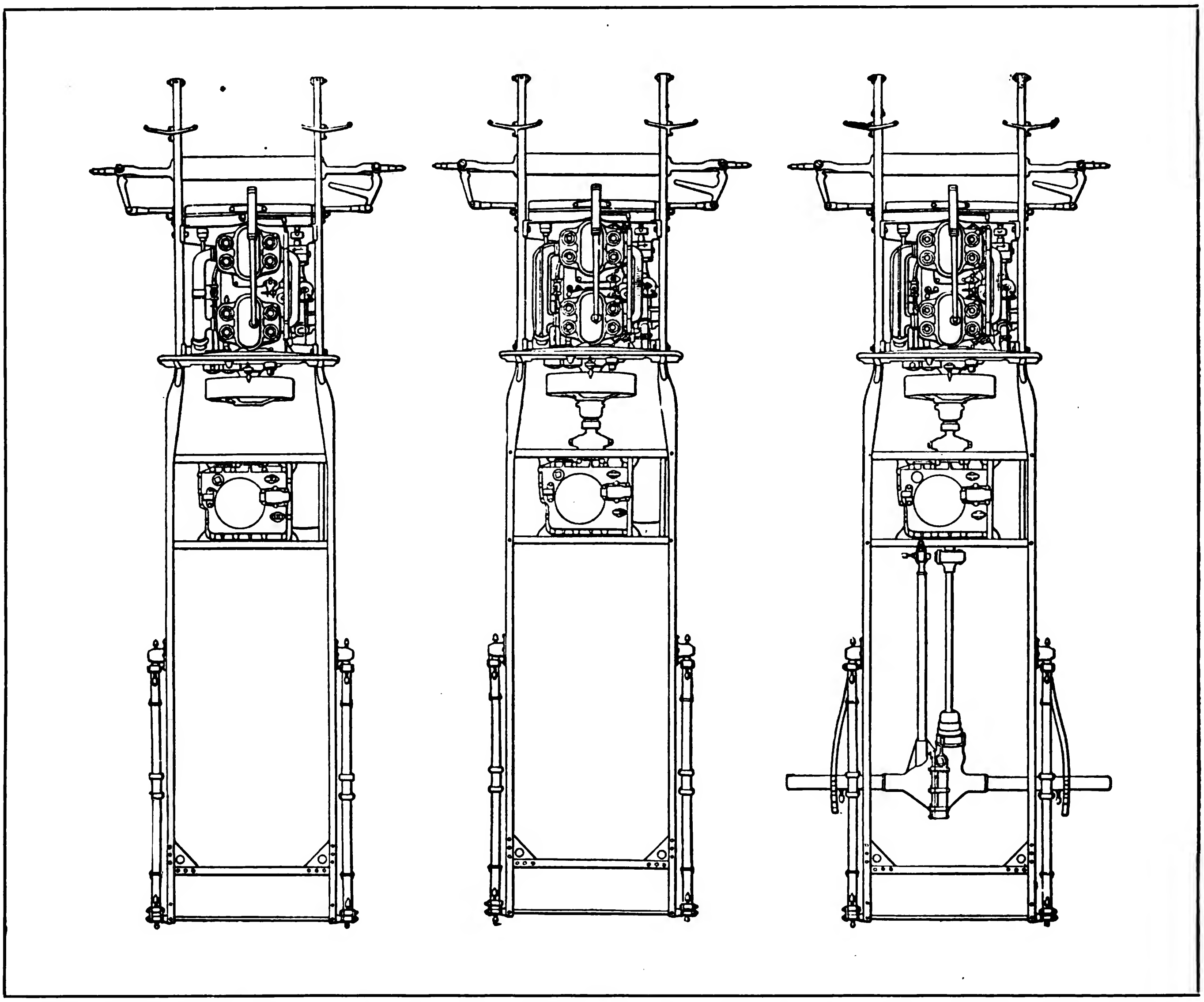
Next, the springs are applied to the frame. The front ends of the front members are bolted to the spring horns and the rear ends shackled. To the underside of these, the front axle is bolted. Then the rear springs are put on with shackles at both ends, those at the front being pivoted in a heavy steel bracket. This gives the whole the appearance of Fig. 2, after which the engine is installed, making it look as shown in the sketch at Fig. 3.

This is supported on four bolts, through the lateral arms of the bronze crank case, the bolts fastening it directly to the side members of the frame. At the same time as the motor is placed in position, the dash-board is added to the group, this being a simple matter of bolting down the horizontal ends of the metal braces to the chassis frame side members.

Next in importance is the transmission, and this follows the engine into the frame. It is fastened by four bolts to the two central cross members, the nuts being cottered and fastened with lock nuts for security sake. Fig. 4 depicts the situation at this point, with Fig. 5 showing the next step—the addition of the clutch and operating fork. This calls for little comment, correct alignment being the only important feature of this part of the work.

In adding the rear axle and distance rods, however, as shown in Fig 6, more care must be exercised. This also means considerable work. Adding the axle is simple enough, consisting of fixing it to the underside of the rear springs with eight bolts, four to each spring, but with the radius rods, the correct length must be secured or the adjusting ends moved to give it. These rods perform the very important function of establishing and maintaining the position of the axle relative to the frame.

The assembling of this part of the car is completed by the installation



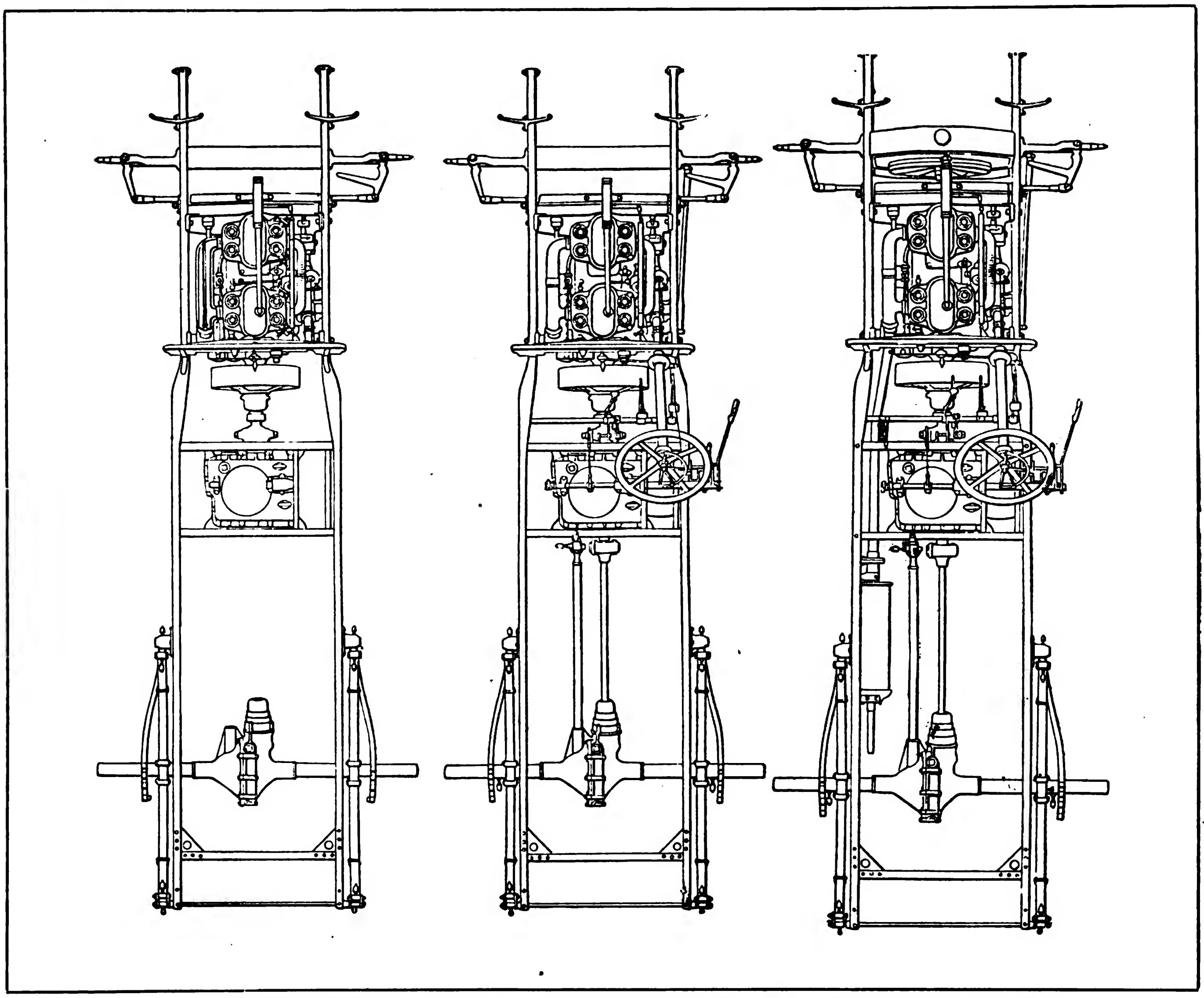
SECONDARY STEPS IN CAR ASSEMBLING: FIG. 4 SHOWING THE GEARSET IN PLACE; FIG. 5 WITH CLUTCH ADDED; FIG. 6 AS IT APPEARS WITH REAR AXLE AND DISTANCE RODS ADDED

of the torsion rod and propeller shaft, the latter first with its universal joint at the front end. This brings the group to the stage of completeness shown at Fig. 7, while the installation of the control levers, pedals and operating rods brings about the appearance of Fig. 8. Before these are placed the steering gear is put in position at the right side, as well as the steering rod connecting it to the knuckles. As the cross connecting rod is assembled with the front axle, this completes the front group except bearings and wheels. Two cross shafts are added, the forward one carrying the clutch and brake operating pedals, while the second takes care of the operating and emergency brake levers. These are put in place and lined up, thus making clutch, transmission and brakes operative.

Next, the installation of radiator and the connecting pieces of hose with their clamps completes the water-cooling system, barring only the addition of the water, while the placing of the exhaust pipe and muffler does the same for the burned gas scavenging system. The resulting appearance is that of Fig. 9.

Since the magneto and carburetor are mounted on the engine and installed with it, while the control levers for both are carried by the steering gear, the addition of operating rods for both and a fuel supply pipe for the vaporizer would complete those very important groups. Running board supporting irons are bolted to the frame, after which the boards and fenders can be added. The former are braced across from right to left, making a strong connection.

Adding the wheels and bearings, and connecting the two sets of brakes within the rear wheels to their respective control rods gives the completed appearance of Fig. 10. With this change the fenders spoken of have been left off to make the situation more clear. Barring only water, fuel, lamps and a body, the automobile is now complete, and ready for the road. The mud pan which protects the under parts from road dirt and projections is supposed to be in place and bolted up tight at this time also.



THE NEXT SUCCESSIVE OPERATIONS SHOW: FIG. 7 WITH DRIVE SHAFT AND TORSION ROD ADDED; FIG. 8 WITH THE STEERING GEAR AND CONTROL LEVERS IN PLACE; FIG. 9 AFTER THE RADIATOR HAS BEEN PLACED AND THE MUFFLER AND EXHAUST PIPE ADDED

Having completed the car, it is not out of place to mention the reverse method of disassembling which would be used in overhauling. This work, usually done in the spring of the year for the purpose of putting the machine in first class shape before the actual driving season opens, should be thorough. Even though every part taken down may not need

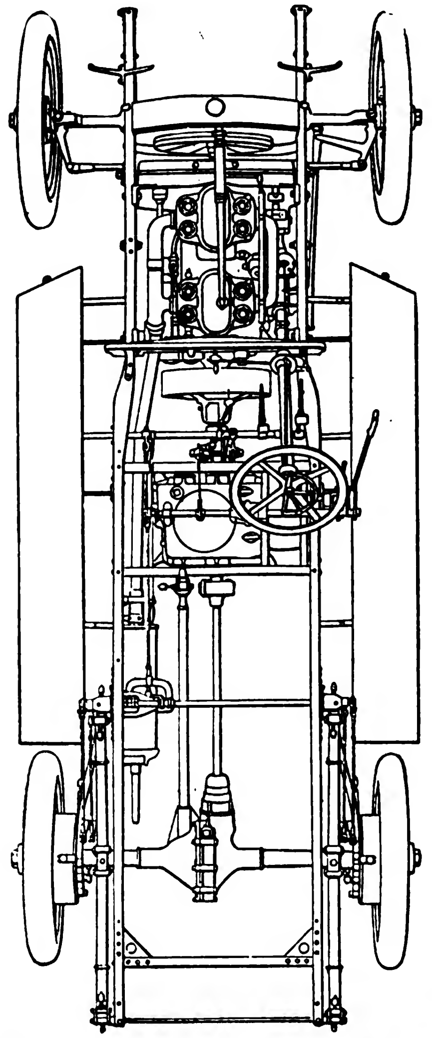


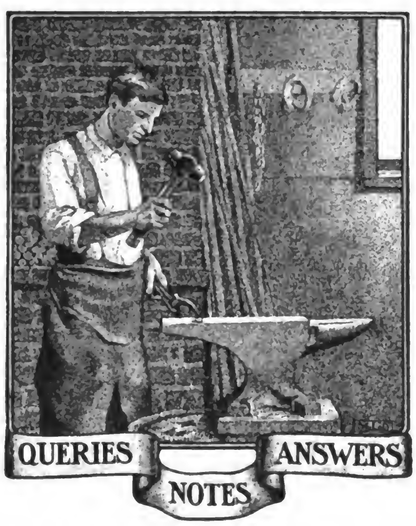
FIG. 10—FINAL OPERATIONS SHOWING STEPS, FENDERS, MUD PAN, WHEELS AND BRAKE RODS IN PLACE

repairing, it is well to go over each and know that it needs no work done upon it, rather than to take a chance.

The reverse process would go about like this: Take off the under pan or pans; free the brake operating rods from the brakes in the rear wheels, and take the rods off of the car; then take off the wheels, followed by the bearings. Next will come the fenders and running boards, while the irons supporting them may be left in place; take off operating rods and levers for magneto and carburetor; remove muffler and exhaust pipe; open hose connection and take off radiator; disconnect steering rod from front axle and take steering gear out of frame; remove control levers and pedals, and shafts supporting the same.

Loosen and take off torsion rod from rear construction, followed by driving shaft and universal joint; after the distance rods have been loosened and taken off, the rear axle can be freed from the springs and dropped down; clutch and fork removed will be the next logical step, after which the transmission can be taken out; it will be well to remove the dashboard at this time or earlier, as it may interfere with working on the engine; the latter comes out next, followed by the dropping down of the front axle; at this stage only the springs, front and rear, with their attaching means are left If desired, these can be taken off next, although they seldom need attention. With their removal, the frame is bare and can be inspected for signs of failure or incipient cracks. If, as in this case, the material is a high grade alloy steel, carefully heat treated, and of large sections, there is little danger of anything like this being found.

In overhauling a car, however, the work should be as thorough as possible. It is a dirty job at best and while in it, it is well to go the limit, thus saving further work of a similar nature for another year, at least. In this renovation, the above description of the method of assembling Locomobiles and the accompanying illustrations should be of some assistance.



Tempering Springs.—I want to know if any reader can tell me the best way to reset and temper springs for a gig or buggy.
H. J. Devonshire, New Zealand.

Information on Forging.—I would like to see a discussion on the cure of forging horses in the paper. I have two animals with which I can do nothing.
D. F. Castles, Missouri.

Wants to Temper Picks.—Would one of my brother smiths give me a tip on laying picks and tempering same, as I have a good lot of road picks to repair and find that some are very difficult to weld. What would be the best steel to use and the quickest way to relay them?
H. Gove, South Africa.

On Sharpening Lawn Mowers.—I have never seen anything in our Journal on the subject of sharpening lawn mowers. As this subject is of interest to large numbers of your subscribers in nearly all parts of the country I think a discussion on the subject is in order. I, for one, would be pleased to hear from as many of the brother smiths as possible who have had experience along this line.
Ernest Hildreth, New York.

A Faulty Grinding Wheel.—I should like to ask a question. I have an Alundum grinding wheel which does not seem to run right. In the beginning it worked fine, but now everything I grind on it bumps as if there were rough places on the grinder. It does not seem to be rough, as I have tried to dress it down and it still bumps. Please tell me the cause and how to fix it.
Herman Lambrecht, Illinois.

Wants a Jointer Table.—I want some information through our Journal as to how to make a jointer table, that is, the easiest way to build it. I am quite a good woodworker, and as the business here is slack I have time to spare and would like to make a table, if someone will explain to me the best way to make it.—S. P., Oklahoma.

A Question on Wagon Brakes.—I would like to have these few lines placed in our Journal. Regarding brakes on wagons I should like some brother smith to tell me which is the proper way to make a brake for a truck platform or three-spring wagons; what I want to know is how much leverage to give to the brake arms and foot lever.
St. Louis Blacksmith.

Wants Information on Stone Tools.—Can anyone give me any information on dressing stone hammers, also tempering? I am having trouble with them, especially the splitting hammers. There was an article in the March number, but it did not go into details.
W. E. Miller, Minnesota.

Some Questions on Shoeing.—I would like to ask through the columns of The American Blacksmith the following questions: First, does any brother smith know of any set rule by which you can measure a horse's foot in order to tell exactly what length of iron is needed to make the shoe? Second, what is the best way to shoe a horse which has just recovered from an attack of founder? Is it better to shoe him with a plain, flat shoe or put a heeled shoe on him?
Harold R. Denize, N. Zealand.

From New Mexico.—I enjoy reading The American Blacksmith every month and profit by it. I run a blacksmith shop and do all kinds of tin work. I make a great many water tanks. I also do all sorts of woodwork, kitchen cabinets, etc. I have a 4-horsepower Fairbanks-Morse gasoline engine, a hand-made 12-inch planer, a 12-inch rip saw and all the other tools a man needs. I have ordered a new saw in order to make apple boxes, as there are a lot of apples raised in my part of the country.
Nole Powell, New Mexico.

Just a Word from Australia.—I may state that I have received some very valuable information from "Our Journal," also some very interesting reading on ancient smith work and smith work in other countries, some of it done by tradesmen of no mean order. The ancient work especially has evidently been done by hand without the aid of machinery such as we have in modern times. Here in Victoria in most of the country shops the work is nearly all done by hand, and I think some of our wagon and buggy work as seen in some of our country district shows will compare with anything in the world for good workmanship and design. I note on American buggies, for instance, a lot of the work is drop forged or malleable castings. Not so with those of Australia. They are all made on the anvil, hand forged.
W. C. Bolitho, Victoria.

Repairing Metal Wheels.—In answer to Brother Wm. Crawley, the way I repair metal wheels is as follows; Shrink the tire until the tire comes down on the spokes. You will need an edge grip tire shrinker, or cold tire setter to do it. Or if you prefer cut and weld the tire; heat tire and end of each spoke, put spoke in vise within one inch of tire and rivet spoke, driving tire down on spoke until a good head is made on end of spoke and the job is done. Cool each spoke and corresponding part of tire before heating the next spoke for riveting.

To straighten a crooked metal wheel when it does not run true: For a light wheel fasten rim firmly to shop or floor, put a long shaft in hub and pull over until shaft is square with rim. For a heavy wheel heat the spokes where they are bent, or the whole spoke if you desire, and pull over with a long shaft in hub. This will make them run true enough for farm machinery and wagons.

HENRY COAD, Nebraska.

On Setting Tires Cold.—I would like to say a few words about cold setting tire, as I read a good deal about this subject and the men who don't have cold tire setters. I was particularly interested regarding Mr. W. K. Huff, of Kansas. Now, if Mr. Huff will just stop and think that in the first place the tire is from $\frac{1}{16}$ to ½ inch bigger than the wheel or it would not be loose and that if you can get the power you can shrink the tire that much cold just as well as you can hot without dishing the wheel. If he sets his tires all $\frac{1}{16}$ to ½ inch smaller I would not give much for them in wet weather. He says he would like to have some cold tire setter man show him. If he will come up to my place, I will show him, and won't charge anything for it, either. We have a No. 2½ Scientific tire setter and would not be without it for anything. Of course, you can't throw the wheel at the tire machine and expect it to set the tire. You have to use your brains, just the same as you do for any other work. I hope to hear from some of the others on cold tire setting. A. B. JENSEN, Iowa.

On Shoeing Advice.—After seeing the first article in the May number I certainly do wish to renew my subscription, as I believe that Mr. J. C. Weaver is at least one who KNOWS what he is talking about. I am only an A-B-C man in this business yet and know that what I don't know would make some book if printed. However, I believe that I do know one or two things. If Mr. Weaver will in his article explain the trimming and fitting for each faulty position he diagrams he will certainly benefit me.

Some of the brothers say—trim it low on the outside—trim it low on the inside—trim it level!! And each one is laughed at by some one else next month in the paper as not quite right. Now, gentlemen, I, and I knew the rest of the craft brothers want to know, which is RIGHT. I believe, of course, that our brothers have had success using the method which they advise, but I also believe that a difference in locality with the same horse or piece of work would utterly change its efficiency. Therefore, it is not advisable to ridicule a man's method. What we need is a right start, such as I think Mr. Weaver gives us, and with that we can work out our own salvation to much better advantage in the shoeing line. What I say is this: Unless you know positively what you are trying to tell, don't bore other people in this trade by an exhibition of yourself and annoy them by taking up space in this Journal which could be put to better advantage.

A. J. REED, Georgia.

On Power and Power Tools.—In regard to power in the shop—a subject which I frequently see mentioned in your journal—I think it is as necessary to an up-to-date shop as the forge itself. About fourteen months ago I installed a light gasoline engine (only 1½ H. P.), a blower with a capacity of four fires and a Rochester hammer "A" size. My only regret has been that I waited so long before getting them. The Rochester hammer is all it is claimed to be. My power plant enabled me to do the work myself which formerly required the assistance of a helper, and that at a cost of only from $2.00 to $2.50 a week. I would advise a heavier engine, as it requires considerable care to operate so heavy a load on so small an engine. Also, power makes the work very much lighter as it will do all the heavy work or nearly all.

H. A. WOODRUFF, California.

Is the Blacksmith Important?—I notice in the May number of "Our Journal" that the question is asked by one who signs his name "Vulcan the First": "Is not the blacksmith the mechanic of first importance?" I want to answer him in large letters "YES," and want to give not merely my reason for thinking so, but wish also to quote you a legend.

After the wise King Solomon had completed the building of the temple, he gave a feast to all that wrought at the building of the temple (some 153,600 men). At this feast something occurred which is no doubt of interest to the craft. When that vast army of workmen assembled they all appeared dressed in their best apparel, clean and neat. The wise King inspected his guests very closely for he appreciated their work. One important man, however, seemed to be missing and His Majesty inquired where the blacksmith was, but turning, beheld him whom he sought. All the other guests looked at the blacksmith with disgust and contempt because he was not dressed in his best apparel. His Majesty looked at the carpenter reprovingly, even though he was clean and spotless, and said, "Who made your tools?" Also addressing the haughty goldsmith, the hewer of stone and other of the mechanics who had wrought important parts in building, the King asked them the same question and they answered as one man, "The blacksmith." The King turned and said to the blacksmith, "Go, wash the soot and dirt from thy face and hands and then come and sit at my right hand, for thou art of first importance—the father of all mechanics."

I. J. STITES, New Jersey.

About Blower Fans.—In the May issue Paul V. Burgess, Missouri, advises Mr. Sidders to use a 12-inch fan because "it produces a sufficient volume of air for any ordinary shop use." I agree with brother Burgess in this, but still I can't help feeling that much time is saved with a stronger blast. It is in the saving of time that the 14-inch has the advantage. Mr. Burgess further says that "the high speed of the small fan produces a blast of high pressure, and high pressure is the result so much desired." I do not know if Mr. Burgess has reference to any special blower, but I suppose he means that the 14-inch Champion gives too much blast and too little pressure. While this may be so, I have had exactly the opposite experience with a new 14-inch Buffalo No. 200 Blower, which I bought recently. It makes cleaner welds than I could ever obtain before, free from scale caused by oxidation, and it runs as easily as any 12-inch blower I ever tried—and I have tried most makes, including the Champion. The reason seems plain enough—the 14-inch gives higher pressure than the 12-inch.

There is, however, one drawback to most 14-inch blowers which has not been mentioned, and that is they run too hard. I believe that this is the only reason why the 14-inch blower has never come into general use. This, however, is not the case with the new 14-inch Buffalo.

GEORGE BOSZOR, Indiana.

Axle Setting and Share Welding.—I have greatly enjoyed the articles in your valuable paper and have found many articles very instructive. One point was especially interesting to me and that was the one about setting axles, but it was not fully discussed. I would still like to find out some method of setting axles so that, by knowing the dish of the wheels and the length of the spokes, the axle guage can be fixed in such a way as to set the axles exact and not require the trying on of the wheels.

As my part in helping the blacksmith fraternity I will answer the questions of Mr. Shickling in the February number. I overcame the trouble he had with his share by bolting the back of the share down tightly to the back share brace and then twisting the front part down so as to make it come down to the proper place. As for the welding of the new share will state that the trouble is due to the spring that is in the sheet of steel which causes the two pieces to spring apart when the pressure is removed. This I have also overcome by means of a machine that welds the share as fast as the steel can be heated. This machine also welds toe calks and turns heels any desired shape or length with one pressure of a hand lever. The principle of the machine is a steady, evenly distributed pressure that welds plow shares, toe calks, etc., thoroughly and correctly. To anyone interested I will be glad to send a drawing or photo of the machine with a description. T. W. MILEK, South Dakota.

A Letter from West Virginia.—I tried the other day to drill a chilled mole board for an Oliver plow and failed. I heated it red hot and put sulphur on the spot I wished to drill and it was no go. The sulphur was very fine—could that have been the cause of my failure? Will someone please tell me how to handle the job. I used the common twist drill in the drill press and they were too soft to cut it.

I was sorry to see in the April number the comments, or slurs rather, that were cast upon Brother Metcalf's picture by Richard O'Hearn, of Kentucky. The less we can have of that sort of stuff the better for all. Brother Metcalf's articles, I think, have been a real help to the readers of "Our Journal." I know they have been to me, but I can't see where anyone would be benefited by O'Hearn's article, especially the part relating to Metcalf's picture.

It seems to me that Brother L. Van Dorin is getting Brother Gunn in rather close quarters on the wheel problem. Come, Brother Gunn, talk up—we want to get to the bottom of the matter and see who is right.

What do the readers of "Our Journal" think about a series of articles on watch cleaning and repairing. I want to take up that business and find it hard to get information on the subject.

I notice in the April number the ad of a book called "The Twentieth Century Toolsmith and Steel Worker." If some of the brothers would get that book and study it we would have fewer questions in the Journal on dressing and tempering all kinds of tools. I have put the directions into practice during the last two or three years and find them all right. I wish I could take the author by the hand, for he certainly did the craft a great favor when he wrote the book. DAVID E. HILL, West Virginia.

A Shoeing Question.—Will you have answered through THE AMERICAN BLACKSMITH the following query: What, if any-

thing, will increase the hock action of a high-stepping horse? The horse steps very high in front. F. D. CONNER, Illinois.

Oil for Quenching.—Being one of your oldest subscribers (having in my possession one of the first issues of the Journal) and still being on your subscription list, I feel free to submit a question to you and would be pleased to receive an answer.

What is the best oil to use for quenching bath for carbonized work, such as gears, arbors and various other parts made of machine steel and steel casting. Is fish oil the best known oil for quenching or hardening edge tools?

A SUBSCRIBER, Pennsylvania.

Can you Tell Him?—Would some brother please answer through the columns of THE AMERICAN BLACKSMITH how I can best get a slot ⅜ inch wide through an anvil block for the treadle of a trip hammer to work in, the stock of treadle being ⅜ by 1¼ inch? I have invented a foot-power trip hammer which works on the anvil. My treadle works directly through the anvil block. Many of the anvils are dug in the ground. Now, in order to get a cut, or slot rather, only ⅜ inch wide, it is impossible to saw down twice with an ordinary cross-cut saw, so I thought perhaps some one knew of a way of making a saw or some other tool which will cut the slot with one stroke.

You know, to work a slot through an anvil block with drill and chisel is quite a job, as many blocks are pretty thick. In case the anvil block is not dug out I simply turn the block upside down and saw up only half way, as the treadle works only in lower part of block, about half way up.

MONROE S. MUMMA, Pennsylvania.

Repairing a Cracked Cylinder.—Seeing Brother E. F. Winter's question in our March number on how to repair cracked cylinder head I will tell him how I fixed mine last fall. To begin with, my engine is a Weber, 3-H.P. I had the experience Mr. Winter refers to, namely, a cracked cylinder, in all four parts. Well, I took off the cylinder head, cleaned the cracks inside and outside of chamber and put the cylinder head on the stove until it was thoroughly dry. I next made a putty of ordinary white lead, spreading this ½ inch deep along the crack inside of cylinder head. I spread some white lead putty over outside of crack and put the cylinder head in the oven of the stove and baked it for two hours. This was an experiment, also a success. I hope it will be of some service to Brother Winter if he should think it worth his while to try it. There is no need for iron bands to this repair. I use my engine every day since I repaired it in this manner.

GEO. A. CUMMINGS, North Dakota.

Repairing a Cracked Water Jacket.—In regard to the cracked water jacket around gasoline engine cylinder, spoken of by E. F. Winters, New York, in the March issue of THE AMERICAN BLACKSMITH, will state that several times I have been called upon to repair cracked water jacket on gas engines. I have used the following very successfully: take a piece of sheet copper, brass or steel, ⅛ inch thick. (I cut the material used somewhat larger than the cracked portion in order that I may have room to bolt the same to the broken portion.) Heat the brass and shape it exactly to the curvature of the cylinder. Next cut a gasket from sheet asbestos, the exact shape of the patch to be used. Drill holes through the patch and the water jacket; tap threads in the holes in the water jacket. Apply "Smooth-on Iron Cement," according to directions, to the broken jacket, place the patch on, being sure to place the gasket already prepared under the same and fasten the patch securely on with stove bolts about two inches apart. This kind of a repair will last indefinitely if made right.

L. P. SAYERS, Kansas.

A Talk on Welding Fluxes.—I would like to discuss one point in which I certainly disagree with the writer of "The Smith and His Work," under the head of namely, welding fluxes, appearing in July, 1909 issue. The usefulness of a flux ends as soon as the work leaves the fire. If I am making a weld with separate heats, I don't put flux on till they are out of the fire. I always have a steel wire brush with which to brush dirt off. Take heats to steam hammer and the hammer man puts compound on heat so as to be between two heats. The compound we use is the "E.Z." advertised in "Our Journal." My idea is this: If you put compound on your work before or during the time it is in the fire the heat of the fire melts or burns the compound and it is no longer the compound it was, because the value of it consists in its ingredients being in proper proportion. When that proportion is altered by heat, it is no longer the nature it was. I know the E.Z. flux is altered by putting it on the steel in the fire and letting the fire burn it into something different. I don't want to appear to know more than others, but this is the result of my observations. I would like to hear from other smiths who have had years of experience on this subject.

T. W. ENDICOTT, Ontario.

Another Side to the Tire Setter Discussion:—Mr. W. K. Huff, of Kansas, asks how a man can make a tire smaller than a wheel by the cold tire process, when the tire is on the wheel. I own a cold tire setter and will give you my experience and opinion. I say you can't make a tire smaller than the wheel it is on. Just as soon as you pull the tire down to the size of the rim it takes the rim with it. I have kinked the rim of the wheel in several places, so that goes to show it pulls the rim with the tire. And a wheel dished with a cold tire setter I find will stay dished, because the rim has been shortened with the drawing of the tire. You dish a wheel "the old way," as they call it, and knock the tire off and the wheel will spring back straight again. I never set a tire on a wheel that it did not wobble more or less after I had set it the cold way. How many brother smiths can take off a tire and shorten it in their shrinker without having to straighten it up edgewise so it will run true after they put it back on the wheel? Now the edge grip machine does it on the same principle, and how can they keep from getting the tire out of true? I have set tires with my cold tire setter till they seem to be tight and have knocked them off, measured the wheel and tire and found them to be both the same. I would like some brother smith to try shrinking an iron band around an iron wheel to see if he could make it tight. There are three cold tire setters in this neighborhood—why have we quit using them? Maybe we don't know how, but I am ready to argue any question that you brother smiths may ask in regard to the kind of machine I use or my experience with it. I consider THE AMERICAN BLACKSMITH Journal a great deal more good to me than my cold tire setter. I cannot do a good job with my cold tire setter and will stay in this arguement until I am shown.

J. SHAY, Pennsylvania.

Lameness and Toe Clips.—In the February issue Mr. Chas. F. Koskey asks for information about a lame horse he has to deal with. His query is very brief and indefinite. If he would explain the gait of the horse when traveling, whether the animal favors the foot at the toe or heel or whether he extends it as far as the opposite foot. It may be a case of navicular lameness, if so the foot would not show any deformity for some time. Or, perhaps, there is a contraction of the cords or tendons. Have you tried a good rubber pad with a fair height of heel to it? If there is anything more you wish to find out, please write me and I will try to answer to the best of my ability.

I often laugh at some of the articles written about toe clips. Now speaking from my own experience will say I have shod horses under all kinds of conditions in different localities and have always had the best success when I was allowed to use toe clips. There are fewer loose shoes and fewer broken feet and, last of all, fewer toe cracks. And some of these evils the cranks on this subject credit to toe clips. By a toe clip I do not mean half of the toe of the shoe turned up, but just a thin clip that is easily hammered to the shape of the toe. This much is certain, if the man at the fire fits his shoe with toe clips the floorman cannot set the shoe back from the toe and blunt the foot off, sometimes almost to the quick. If a clip is good for a poor foot, why is it not good for a good foot?

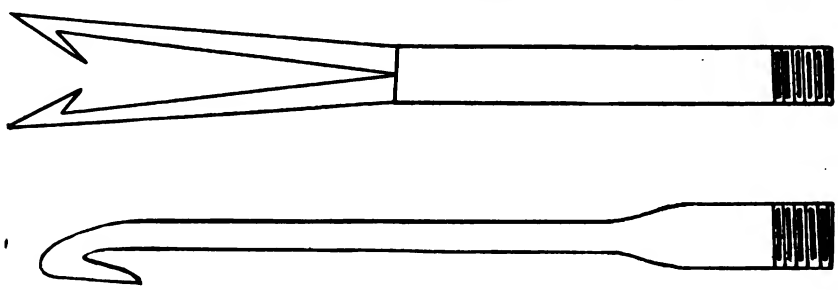
We have had a very good winter so far in this locality, but we have lots of cheap opposition. I hope and expect some day to see some real legislation on horseshoeing. Should like to hear more about this subject. C. L. MORMAN, New York.

Several Answers to Questions.—I will answer a few questions in the February number of "Our Journal," but will first say that the old saying is still true that a fool can ask questions that a smart man can't answer. First, Brother Huff, of Kansas, states that he has been setting tires for thirty years. This I don't doubt, neither would I have questioned his honesty if he had said sixty years instead of thirty. Nor do I doubt that he has worked in different States, while I am bound to admit that I never left my native State to seek a better one. I have always found employment at home at a reasonable profit. Now to get back to the question. Brother Huff stated that a tire had to be from $\frac{1}{16}$ to ½ inch smaller than a wheel and wanted some cold tire setter man to tell him how he could make a tire smaller than the wheel with the tire on the wheel. I suppose he is from Missouri, so I will show him. First I will say that he never did put a tire on a wheel that was smaller than the wheel upon which it went. His tires are always larger than the wheel when he puts them on and remain larger as long as they stay on. Now, I let Brother Huff make his tire ½ inch smaller than his wheel, heat it

and put it on, and I will take the same kind of a wheel and set it cold on a Brooks cold tire setter. After they are both set we will knock both tires off and measure wheels and tires, and if my tire isn't as much less than the wheel as his is I will walk and he can ride. Yes, you took a shot at Brother Wright, of Texas, but say, did you know that you missed him?

Now as to Brother J. B. W. Morris's questions: First, what class of people, as a whole, do you consider to be the best educated? Why do you think so? Answer: The Preachers, but I don't think it any of your business why I think so. Second, What class of people have been of the most benefit to the world? Answer: The Inventors. Third, Why are bastard files called bastard files? Answer: Mr. Bastard invented them, don't you reckon?

E. E. SMITH, Kentucky.



TWO SIMPLE TOOLS FOR THE WELL DRILLER

A Note on Shoeing.—I like the paper very much, but I take exception to some of the instructions about shoeing. I don't pretend to know it all, but I have done shoeing in seven States, and have gotten my share of the work. In the different States the smith has to do different work. In this State you cannot pare the heel down too close. In California you do not dare cut the inside of the hoof. You have to find out just what you are up against before you go ahead, but, for goodness sake, let the bars alone. CHAS. GLENN, Montana.

Blacksmiths and Other Mechanics.—I want to say a few words about blacksmiths. They are, of all trades, the hardest worked and poorest paid. All other classes of mechanics work eight hours a day: the laborer with his pick and shovel works nine hours; the blacksmith all the way from ten to twenty-four. They are afraid to get together and establish an eight-hour day and a schedule of prices so they can make something and live like white men. They are always writing about giving their customer his money's worth—a good, honest job. What do you suppose their customer cares for the smith—the customer goes where he can get it the cheapest.

FRANK NEAGLE, OREGON.

Two Well-Drilling Tools.—Your valuable journal is very much appreciated by me. It has a lot of valuable information in it. I run a repair shop; I don't shoe horses. I do wagon and buggy repair work and sometimes get out and repair fire engines and boilers. I get all I can do.

Some time ago I was boring a well with a 2-inch auger, and the pipe broke off, leaving the sleeve. I made a grab out of ½ by 2-inch stock, as shown, slipped it over the sleeve and got the pipe out. I also made a grab to pull the pipe by putting the grab inside the pipe. The crook acts as a heel and throws cutting point into pipe sufficiently to hold it. This may not be new, but may help some brother.

M. E. STAGGERT, Alabama.

A Talk on Several Topics.—I thought I would write and let the boys know that we still run a shop at this place. It has been running now about thirty years. I do all kinds of work in the way of repairing, have made wagons and buggies from start to finish, but have never worked under any man. I studied it out, learned it from a praticable point, that is to say, "If at first you don't succeed, try, try again".

Our tools now consist of a 6 H. P. gasoline engine which has been running for one year and three months without one cent expended for repairs. It is now in fine running condition and runs every day. It is the easiest engine to start I ever saw—no trouble whatever. It runs an 18-inch rip saw, a planer, three emery stones (the largest 3 by 20 inches, and the smallest ⅜ by 10, a 36 by 4-inch grindstone, sand belt, drill, blowers, etc. Of course, we have a lathe that does all kinds of turning as this is very essential in any shop. Our other tools consist of all kinds of hand tools for wood working by hand, and will say here that we use the best that money will buy. The blacksmithing department has all kinds of tools for doing any kind of work: furnaces, tongs, etc. We carry a full stock of spokes, rims and a line of bolts, shoes and the different sizes of iron and steel.

I want to say here that I do not always buy of the jobber salesman. I buy from reliable catalogue houses when I can make a saving. I have bought from several catalogue houses and my dealings with them have been most satisfactory. If you buy anything from these firms and it is not just what you want you can return it and there will be no kick coming from them. It is a pleasure to do business with people that will treat you right and on the square. This is not written to advertise these houses, but it is for the good of the blacksmith, telling him that these goods are good. If a blacksmith can save enough on a $5.00 order to pay for this paper for one year it is to his advantage to do so.

We have at this time all the tools that we need except a band saw. This we will buy later on as we have no room for it in the shop. We intend enlarging our building in the summer. Our present building is 60 by 28 but is too small.

J. D. SKIDMORE, West Virginia.

A Letter On Several Matters.—I would not like to be without "Our Paper" on any account, as I value every copy very much, indeed, especially while Benton's recipes come along. Apart from these, I do not pick out any article especially, as I consider they are all instructive; not that I agree with all of them, but it causes me to think and consider things that perhaps I would otherwise pass over.

There is one thing especially I notice in all the articles on horseshoeing—not one mentions how every horse's feet should be when it is shod (except in cases where the feet are deformed through accident, etc.), and that is, that the inside of the horse's feet should be the straightest side. Now, I maintain that the man who knows that need not bother himself about Brushing shoes, etc., because if he takes notice of his horse's feet before shoeing he will have him standing straight on his feet when he is shod, which is one of the chief things in horseshoeing. Besides, a horse's legs are so close together that it stands to reason that the inside of his feet should be the straightest. We all know our left boot from our right, so why should we not know a left horseshoe from the right. Another thing I notice is that some writers will say they always shoe to the foot. Just to show where they are wrong (or rather that they have not gone far enough), supposing a horse is turned out in the paddock for six months and is brought in to be shod, you would hardly think it right to shoe to that horse's foot. I should think the right thing would be to first make the foot as it ought to be, and then shoe to the foot.

I noticed also in one or two of the back numbers of "Our Paper" some writings on tyre setting under the old process. One man said that it all depends on how many times you put a tyre in the fire in order to ascertain the tightness of it when running the traveller on it. Another man said that it all depends on the size of your fire, meaning that the larger your fire the further round the tyre will the heat travel and you will not have it so accurate. Now, I am surprised at men writing like this, as they must know you cannot guess the tightness of tyres and accomplish good work. My way is to cool out my tyres every time before running the traveller round; then there is no guess work. It pays you to do your tyre setting properly as well as all other work, as a satisfied customer will always bring another one.

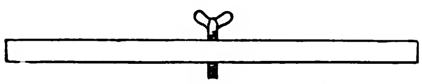
I never see much in "Our Paper" about bullock shoeing. It is a specialty with me. I, with the assistance of a boy, have shod 350 bullocks from the 24th of last October to the 4th of March. We have a very up-to-date apparatus for shoeing them and get through with the work very quickly. As an instance, one day recently the lad I have with me (who has been at the trade 18 months) and myself shod 12 bullocks in 3½ hours, this time including everything except making the shoes. Another day we shod four bullocks in two minutes under the hour. I get 4s 6d ($1.10) for each bullock I shoe with new shoes and 2s 6d ($ .60) for removals (of which I do very little). I might mention that I have customers who have to drive their bullocks 40 miles to me to be shod, although there are two so-called shoers living quite close to them, which I suppose speaks well for my work.

I have just received my February number of "Our Paper," and notice one article by W. H. Huff of Kansas on cold-tyre setting which I agree with in every particular. I want to know how it is possible to make the tyre ⅜ of an inch smaller than the rim without injuring the wood? If it is not noticeable at the time, I maintain

that it will not be long before the rim will split at the spokes. Again, under the old system of putting on tyres, you have a screw with which to hold the wheel firmly on the plate. Then, when the tyre is put on hot (with the proper tightness, of course), everything in the wheel tightens at the same time. Now, under the cold process, with a great many of the cold-tyre setters there is nothing used on the hub to keep it firm, and how are the spokes going to tighten in a wheel like that? The wheel must become rimbound in time and also loose in the hub long before it should. My idea is that a good man on a wheel in the old way will hold his own with the best tyre setter, and although he may not do as many in a day he will have the satisfaction of knowing what he has done is done right. I think I will stick to the old way for a while longer at least.

W. MURDOCK, New South Wales.

An Interesting Letter from Shetland.—I served eight years of apprenticeship. The work was principally fishing vessels, iron work, shoeing horses, making farm implements, soldering and making knives for splitting and heading codfish. These knives



DEVICE FOR SETTING TIRES COLD

vary in length from 5 to 16 inches. I have made hundreds of them. It takes a well-tempered blade to cut fish-bones all day long, and at the same time be pliable enough to bend. I find double shear steel the best stock to work from. I have tempered them in many ways and in various kinds of oil; the best results I obtained after long experience were obtained as follows: After the knife has been forged, and is being heated for hardening, heat it slowly in a clean bright fire, free from smoke; keep edge down, turning it over first on one side and then on the other, not deep in the fire, but close down in a groove in top of the fire. Keep on moving it to and from you all the time till it becomes a ruby red at edge and half way towards back. Take it out and hold it a second or two till it cools a very little, then plunge it in rain water, point first, straight down, quickly but nor rashly, or it may bend or crack. Hold it in water a second or two before taking it out. After cleaning the surface on grindstone I coat it with colza oil, as I find that kind of oil more suitable than any other. Draw the temper by holding it over a clean, well-burned-out fire—back down this time—turning it over a little from side to side and moving to and from you as before, until a new saw file can bite it. Quench it in water again. With a little practice one can estimate when it has arrived at the desired stage by the color shown, always bearing in mind that it must be at the same heat before the first plunging in water, otherwise your judgment by color will not be correct. Much is due to the amount of heat given before plunging in water.

Now let us give attention to horses. Mr. E. Mann seems to carry the palm for speed at horseshoeing. I wish he could shoe the ones I have to shoe, as I never liked the job, but have to do it. At times I have had to shoe little ponies which were to be put on exhibition at shows. Their ages ranged from two years and over, including the champion stallion of the stud ponies belonging to H. F. Anderton, of Vaila Estate, Shetland. These are little beauties and stronger in proportion than larger horses. I wonder how many of this class Mr. Mann could shoe in one day, putting their first shoes on. I am not certain as to their exact height, but the extreme length of the leg is not so high as up to my knee, so that there is no possibility of getting their foot on one's knee. And holding the foot, shoe and nail in the left hand is rather a difficult job to begin with. These shoes measure from 2½ inches to 3 inches across, with nails 1⅛ inches long. I have in one day made the shoes and shod five of these ponies for their first time; could have done more, but no more of this class to be shod that day, and pleased I was, I assure you. I put no strapping on them; one man holds the pony with a loose halter. A practical horseshoer knows there is not much hoof to work on in this class of shoeing. I spend more time when shoeing a horse for the first time in going around lifting all his feet and tapping on them (not holding up long at a time) than it takes me to drive the shoes on. I get him well in hand before starting to drive; it is time well spent, as I never find any reasoning faculty in horses, and, therefore, I try my utmost not to let him find out the difference between his strength and mine. If, by chance, he discovers his superior strength at the first shoeing—even with one foot—he is going to give trouble again next time he is being shod, with that same foot, though not with the others. This proves the depth of a horse's reasoning. Why should not his other three feet have the strength he discovered in one of them? Simply because he did not find it out at his first shoeing. At the first shoeing of nervous horses I shoe the front feet first. I put a few nails in one and then go to the next and do the same, then back again to the first so as not to hold up one foot too long until he wants to fight for the mastery, as he may gain a point by that. In shoeing fractious horses one must get control of them by will power, and in gaining this control they cannot all be treated alike. I have shod some that tried to kick me if I treated them too kindly or patted them; if I kicked them they also tried to kick me; but by shouting at them they submitted to be shod, though with a grudge. When shoeing this class of horses one must remember that everything affects them. Even putting a light, trembling hand on them annoys them; therefore, when putting your hand on them, do it firmly and steadily. In shoeing tractable horses I start by knocking lightly on nail until it is well placed in hoof, and then deliver a few heavier blows to drive it through, knocking all the time. But not so with nervous horses, or more especially those shod for the first time. I find that I succeed much better by allowing an intermission of a stroke after every three or four strokes and knocking lightly until the nail is in.

Now for engineering. I see a little about it in the Journal. I should like to see more. My apprentice master had served an apprenticeship at engineering, and during my time with him we fitted up a few small three-horsepower engines from the rough castings, and since then I have had lots of experience in this direction. And motors—one can never learn too much about those at present. There are several electric ones and hot-tube ones I am called on to overhaul and put in working order. I find items in the Journal useful to me, but would like to see more.

I will conclude, hoping this will be of some little benefit to some beginner and, as the clown said about his tricks, "I have given a thousand, but still have a bag full unopened." So, if I see this in print, you may hear from me again; but if it only sets up a mark to be shot at, fire away, for I am now of age to enjoy it.

PETER PETERSON, Scotland.

In Favor of Cold Setting.—Much has been said about cold tire setting, and I have just read about Brother Richard Loades, of Kansas, who says it does not seem right to him to cold stove iron or to kink it. I say that there are no reasons for kinking a tire in cold setting it, as a man has it in his own hands to keep the tire straight and not kink it on any machine. I own a Scientific hydraulic cold tire setter and I set over 1200 tires in 1910. I can set four buggy tires in about twenty minutes and do a good job. I have set four in eight minutes, too, for a man held the watch. I have set several set of wagon tires in twenty minutes and in no case need more than thirty minutes to a set of ordinary wagon tires. One brother says that he wants some cold tire setter man to explain how he can make any tire smaller than the wheel and do it with the tire on the wheel. Well, here's the answer: in the first place you understand, Mr. Huff, that a wheel won't go to dish any before the tire is off the rim. My tire setter drives the two heads together about 1/16 of an inch on an average. Therefore I have a gauge made as in the engraving and I set the thumb screw against the spokes, the straight edge being against the rim or tire and commence to pump, watching the thumb screw at the spoke or hub. When it begins to leave the spoke I count one, two, or four for wagons. I have set a tire in this way and taken it off the wheel and having measured it found it exactly that measure on a 1⅛ by ¼ tire on a spring wagon wheel. Of course, on a wagon wheel it will usually take one extra stroke of the punch handle, say five strokes to make it ¼ of an inch on a thick tire. To the simplicity and rapidity of setting tires cold add the lessening of the blacksmith's expenses and discomforts: no burnt arms, no hot fires to bend over in hot weather, no kindling to cut and carry out and no smoke in the eyes.

I wonder what our readers think I get for writing this letter. Well, I get just what every reader of THE AMERICAN BLACKSMITH gets by reading the article. If he will buy a cold tire setter, he will profit by the reading, but if he does not, it will pass out of his mind after a time and no good will come of it. It does seem to me that any fair-minded man can see the advantage of the cold setting process. I have worked at the trade all of my life, so to speak, and am running a shop of my own for over twenty-six years. During this time I have set tires in every known way; cut and welded them and shrunk them with two pairs of tongs and a helper and have used a hot tire shrinker and now I am using a cold tire setter, which I do earnestly think is the best way. One says stoving a tire cold might cause it to break in cold weather. Out of the 1200 I set last year I have not had one single tire to weld on account of breaking in cold weather. I did break three tires by gripping them in an old weld, but that was my fault. Now I think I have said enough about cold tire setting for once, but if any brother wants more I can tell him. This letter is unsolicited and I am not writing it for any reward, but I do it for the benefit of our brother readers.

My shop is, I think, well equipped: Two brick forges with Champion 400 blowers, Easy trip hammer, Fairbanks-Morse Gas Engine, Champion power drill, Reese No. 203 emery wheel, rip, cut-off and wood saws, disc sharpener, grindstone, cold tire setter, hot shrinker and Balingers hot tire setter, and all the small tools which are regularly needed in an up-to-date shop. I have also a Barcus horse stock which I like very much. My shop is 20 by 78 feet. I own my shop, four lots, a seven-room dwelling and thirty-eight acres of farm. I farm as a side line.

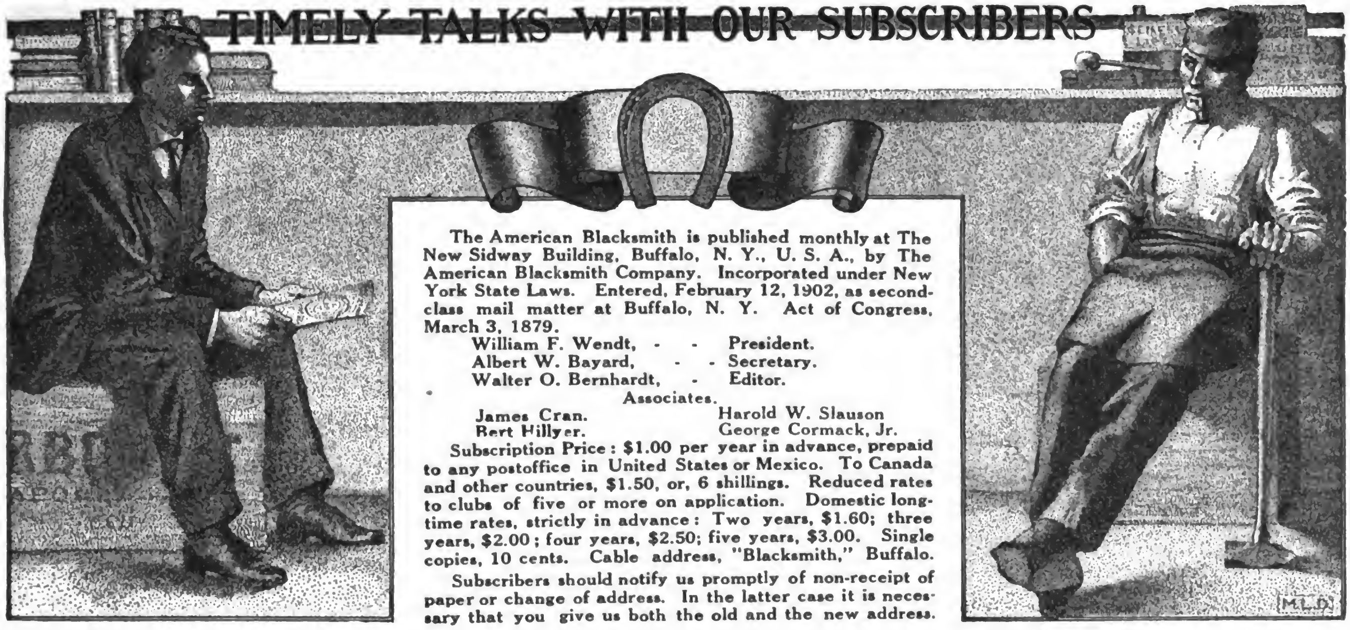
J. W. JEFFRIES, Missouri.

VOLUME 10 NUMBER 11

THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO N.Y. U.S.A. AUGUST, 1911 $1.00 A YEAR 10c A COPY



The American Blacksmith is published monthly at The New Sidway Building, Buffalo, N. Y., U. S. A., by The American Blacksmith Company. Incorporated under New York State Laws. Entered, February 12, 1902, as second-class mail matter at Buffalo, N. Y. Act of Congress, March 3, 1879.

William F. Wendt, - - President.
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Subscription Price: $1.00 per year in advance, prepaid to any postoffice in United States or Mexico. To Canada and other countries, $1.50, or, 6 shillings. Reduced rates to clubs of five or more on application. Domestic long-time rates, strictly in advance: Two years, $1.60; three years, $2.00; four years, $2.50; five years, $3.00. Single copies, 10 cents. Cable address, "Blacksmith," Buffalo.

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There is perhaps no other publication which is more surely the reader's own paper than The American Blacksmith. "Our Journal" is the reader's paper, not merely in name, but in fact. The American Blacksmith since the printing of the first issue has been devoted to the interests of the blacksmithing craft, first, last and always and we want every reader of the paper to consider himself a contributor or reporter. We want you to tell us what you are doing; what your neighbors are doing. If a new smith moves into your neighborhood or into your town, let us know about it. If you have purchased a new machine, or have put in power, or have made any other changes in your business, tell us about it and how you like it. In short, let us have every little item concerning anything pertaining to the smithing craft. Nothing concerning the smithing trade is too small to warrant our attention. And do not think for one minute that you can write us too much or too often. We want to keep in close touch with you and the trade and can only do so with your help.

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Valuable Advertising

When a paper does not contain enough editorial or reading matter, the reader may be justified in saying that there is too much advertising in it; but such an assertion cannot be made concerning The American Blacksmith. If you consider that every month "Our Journal" contains never less than twenty-six pages of practical reading matter and that these twenty-six pages contain nothing but usable smith shop matter, you must wonder how any one could ever think of putting up the "Too much advertising" excuse. We have always believed that if a man read The American Blacksmith as he should read it, he would find its contents all he could possibly attend to. And when we say this we are not excluding the advertising pages, for were it not for the advertisements, how would you have learned about new machines, new goods and new tools? How would you learn about where these are manufactured, where they are sold? The subscriber and reader who disregards the advertisements is missing lots of information that the advertiser invites him to ask for. If you doubt the value of the advertising pages, write to a number of advertisers right now. There is lots and lots of advertising matter that is just as valuable as a trade text book. Don't disregard practical information simply beacuse it appears as an advertisement. Read the advertisements with the idea of getting all the practical information you possibly can and when the advertiser asks you to write for more information, do not disregard his invitation. Consider the advertising pages—they are full of practical trade information.

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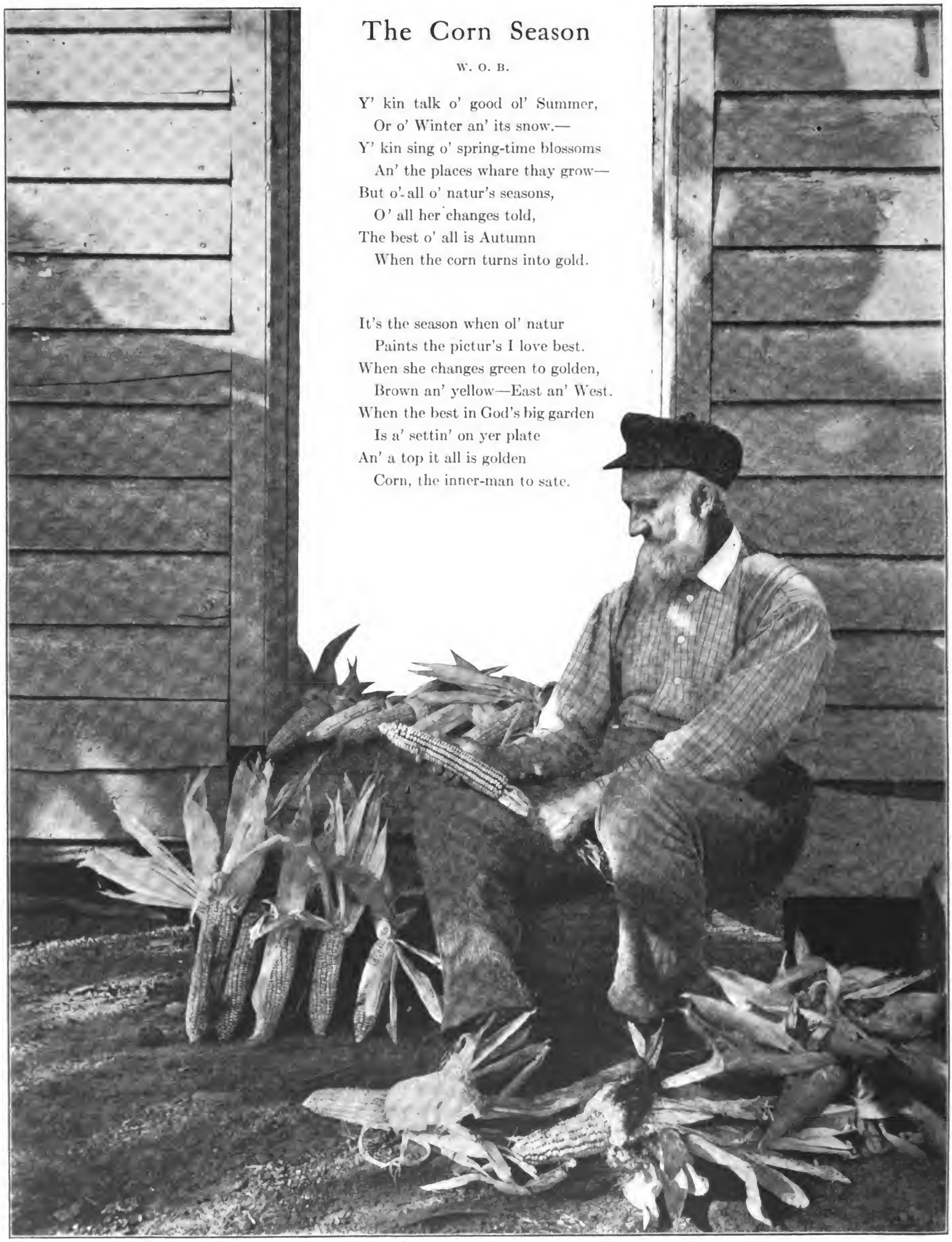


The Corn Season

W. O. B.

Y' kin talk o' good ol' Summer,
  Or o' Winter an' its snow.—
Y' kin sing o' spring-time blossoms
  An' the places whare thay grow—
But o' all o' natur's seasons,
  O' all her changes told,
The best o' all is Autumn
  When the corn turns into gold.

It's the season when ol' natur
  Paints the pictur's I love best.
When she changes green to golden,
  Brown an' yellow—East an' West.
When the best in God's big garden
  Is a' settin' on yer plate
An' a top it all is golden
  Corn, the inner-man to sate.

What Heat Treatment Does to Steel

The Changes That Occur, and Why

IN 1868, Chernoff, in Russia, showed that steel could not be hardened by rapid cooling if it had not previously been heated to a very definite temperature—a temperature designated by him as *A*.

In 1869, Gore, in England, showed that a curious change occurred upon heating an iron wire. Then Barrett, in 1873, repeated Gore's experiment and discovered that when the iron wire was cooled down, paradoxical as it may seem, it suddenly glowed, and he termed this phenomenon recalescence. Investigations carried out by G. Forbes in 1874, Norris in 1877, and Tomlinson and Newall in 1887-1888 proved that the same phenomenon occurred upon raising the temperature, but at a point some 100 F. higher. To differentiate between these two phonomena the term decales cence was applied to it on the rising temperature and recalescence when it occurred on the falling temperature.

Osmond, starting from the observations of Gore and Barrett, started to make further researches. Using a thermo-electric couple of platinum and platinum containing 10 per cent of rhodium as a thermometer, in conjunction with a chronograph, he demonstrated, as might have been expected, and proved that the phenomenon of absorption or evolution of heat was the surest indication that molecular rearrangement was progressing in the mass says David Landau in Motor

The means of carrying out these observations were very simple, and the principle of the apparatus may be understood from Fig. 1. The steel under investigation was enclosed at *A* in the porcelain tube *T*, and a bulb *B*, filled with calcium chloride, insured dry air in contact with the steel. A thermo couple *H*, placed in contact with the steel, measured its temperature through the galvanometer *G*, which threw a spot of light on the screen *S*. The mirror *M* reflected the light from the lamp *L*, through a small hole in the screen, upon the oscillating mirror of the galvanometer.

After raising the steel to a bright red heat it was allowed to cool slowly, and the rate of cooling, as indicated by the movement of the spot of light on the screen, was recorded by a chronograph.

Austen's Experiments

In experiments made by Prof. W. C. Roberts Austen and cited in his work "Introduction to the Study of Metallurgy," 1902, it is shown that the rate of movement of the spot of light, *i. e.*, the rate of cooling, varies with different samples of steels. Stoppage of the movement of the spot of light indicated an evolution of heat in the cooling mass. A mass of electrolytic iron, which is a free form of iron, was allowed to cool slowly from a temperature of 1,200°. The

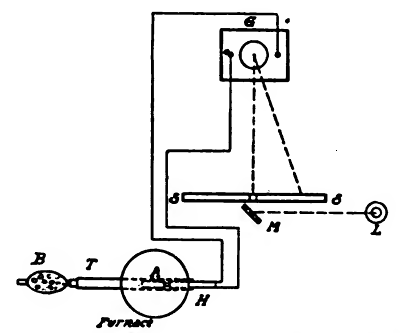


FIG. 1—APPARATUS FOR MEASURING THE RATE VARIATIONS IN THE HEATING AND COOLING TEMPERATURES OF A METAL

cooling proceeded at a uniform rate of about 2.2° per second, until a temperature of 870° C. was reached, and as the temperature of 858° was reached there was a sudden arrest in temperature drop—the spot of light instead of falling at a uniform rate of 2.2° per second took 26 seconds to fall through a temperature of about 13° C. By using a mild steel instead of the pure iron, two such temperature arrests were observed, but these manifestations took place at different temperatures than with pure iron. In the case of a very high carbon steel, containing 1.25% carbon, the duration of temperature arrest was as long as 76 seconds. Prof. Austen also observed that, as the carbon content was increased, the first and second arrests of temperature approached each other. The results of a recent test made on a 1.00% carbon steel to determine the points of decalescence and recalescence are shown in Fig. 2.

We may now ask if the carbon component has an influence on the cooling of steel, as it appears to have, how does steel behave when cooled rapidly as in hardening?

It is known that during rapid cooling carbon is retained in the state in which it is dissolved in iron as a carbide; but it has been shown that during slow cooling the dissolved carbon can separate itself from the iron so as to assume a form in which it occurs in soft steel. It is claimed that this second arrest in the fall of temperature corresponds to recalescence, and is caused by the reheating of the steel by the heat evolved when the carbon leaves its state of solution and chemically combines with the iron.

From these observations it follows that in order to harden steel it must be rapidly cooled before recalescence occurs, otherwise the carbon cannot be retained as hardening carbon. The first break in the cooling curve of pure iron (iron free from carbon) can be explained as follows: There is a molecular change in the iron itself, with which the carbon has nothing whatever to do, and there exist two kinds of iron, the atoms of which constitute hard and soft iron.

Allothropic Forms

In red-hot iron the mass is soft, but the molecules are hard, and this is called β iron. When cooled either slowly or rapidly, the iron becomes soft and passes into the α modification. The presence of carbon alters the conditions of rapid cooling and induces different effects. A certain proportion of the molecules are retained in the hard form, *i. e.*, the β

modification, and are retained in the state in which they existed at a high temperature, and hard steel is the result.

During slow cooling the change from the β to the α modification takes place, which is indicated by the first break in a curve plotted of the slow cooling of iron. The fact that it occurs only in pure electrolytic iron is a proof of the above statement. The second break denotes the point at which carbon, as such, changes from a purely dissolved form of hardening carbon to the combined or carbide form.

Hence, by quickly cooling steel, after the conversion from β to α has occurred and before the carbon

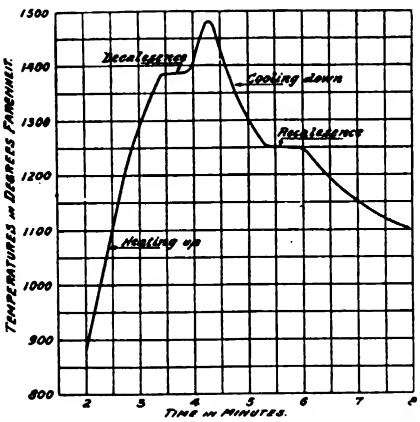


FIG. 2—RATE OF RISE AND FALL IN TEMPERATURE, WITH DECALESCENCE AND RECALESCENCE, IN CARBON STEEL

has changed its mode of existence, or before the second arrest of temperature has occurred, the iron should be soft. These and other facts have actually been observed, and hence we have strong reason to believe that iron exists in two modifications. Without going into further detail and citing experimental evidence, suffice it to say that a third form is also known to exist, and plays an important role in the hardening of steels.

Phenomena in Non-Ferrous Metals

It may be of interest to digress at this point and inquire if the phenomena of decalescence and recalescence, as observed in iron and alloys of iron and carbon, are not also present in the treatment of other alloys. Experimental evidence is not wanting on this point, and of more than ordinary interest are the experiments conducted by Prof. W. C. Roberts Austen about the year 1894, on the triple alloy of tin, lead and bismuth, known as Newton's alloy. A suitable alloy is one made of 50 per cent bismuth, 31¼ per cent lead and 18¾ per cent tin.

In cooling this alloy from a molten state and long after it has solidified, there occurs a remarkable rise in its temperature. This evolution of heat also occurs if the mass be quenched in water and removed quickly. The evolution of heat occurs at 115 F. Repeating this process of heating and cooling, say three or four times the evolution of heat on cooling ceases but may be restored by remelting the mass. The fractured surface of this alloy, before the evolution of heat takes place, presents a plate-like crystalline and almost vitreous appearance, but after the thermal change the fracture is gray, dull and finely grained.

Effect of Molecular Change

Here then we have phenomena not entirely dissimilar from those observed in the process of hardening iron, carbon alloys or steel. But in this case we have either one or two of the three metals present playing a part not unlike that played by the carbon component in the iron-carbon alloys. This triple alloy solidifies at about 205° F.

The tensile strength of the alloy in the vitreous state is about one ton per square inch, but after the molecular change it reaches 2.25 tons per square inch. Annealing the mass at between 175° and 195° F., after the molecular change has taken place, increases the strength slightly. Between 176° and 197° F. the alloy contracts at an average of .00008 of its length per degree F., and then the rate of contraction deminishes gradually until 120° has been reached, when it ceases to do so and then expands. The expansion is about 1 per cent of its linear dimension, and is accompanied by a rise in temperature.

The reverse of the above process, *i. e.*, contraction with the absorption of heat does not happen at the expected temperature, but at a higher one. This would point to the fact that the molecular change in this alloy, as in steel, is due to a chemical combination and to disassociation on heating.

Applying Pressure

At this stage of the investigation it was thought desirable to determine if the application of pressure to this alloy would cause the change to occur at a lower temperature than when no pressure was applied. We quote Prof. Austen, his lecture on "Alloys," delivered before the Society of Arts, London, in 1893:

"A steel die was formed with a surrounding water jacket, as shown in Fig. 3. The plug of the die had a steel socket, in which the thermo-junction was inserted so that the pressure did not come upon it in any way. The alloy *N* was poured into the cavity of the die, which had previously been lined with several folds of paper; the die was closed and placed in the press, and then heated until the metal again became fluid.

"A steady stream of cold water was then run through the water jacket; and by the thermo-junction inserted in the socket before mentioned an, autographic record of the temperature change was taken while pressure was steadily applied to the die. It had previously been found that the abnormal rise of temperature in the

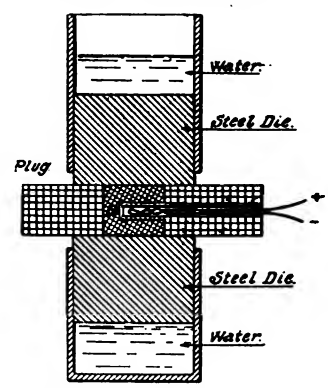


FIG. 3—METHOD OF APPLYING PRESSURE TO THE COOLING METAL

absence of pressure was coincident with the expansion of the mass. The result of the experiment, however, showed that under a pressure of one ton per square inch the temperature at which the thermal change took place was lowered as much as 4° C., and that a pressure of about four tons per square inch was sufficient entirely to prevent the thermal disturbance. That pressure lowered the critical point was made evident, and its complete obliteration was also shown, but on opening the dies and breaking the alloy the change of structure was progressing. Hence it is really impossible to say absolutely whether the change took place under pressure, or just when the pressure was relieved. The latter is very probable."

Results

We have described these experiments at length, and the reason for so doing may now become evident.

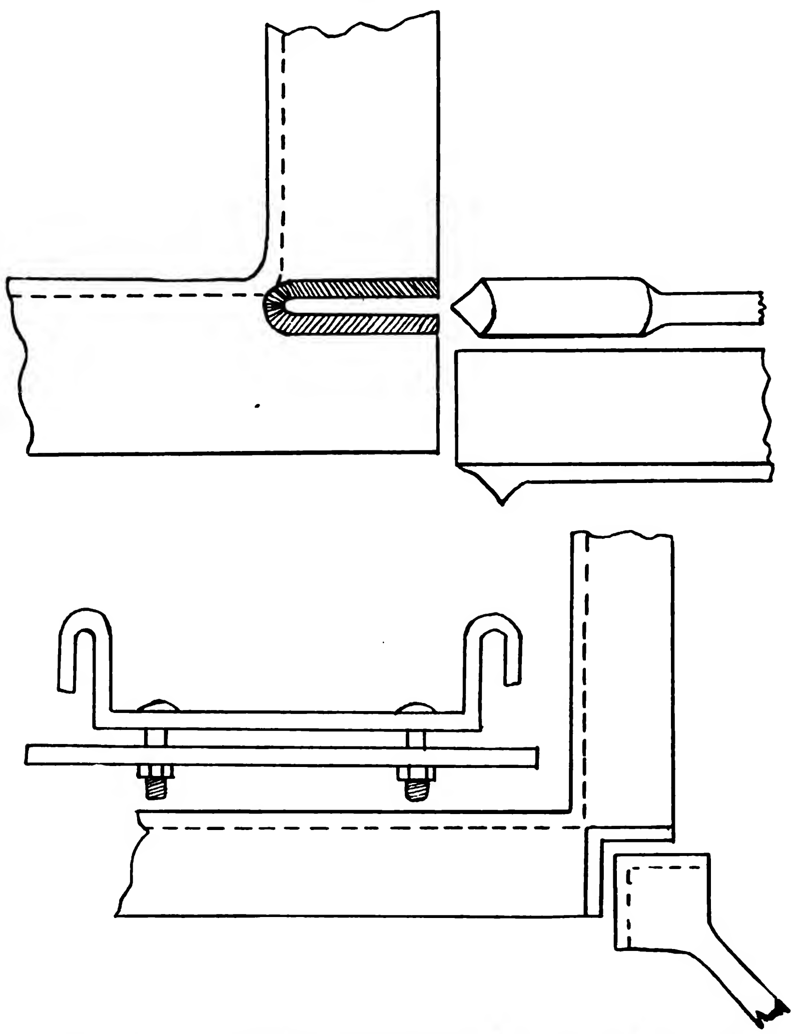
Allowing steel to cool under pressure, the recalescence point is lowered. When quenching large pieces of steel in water sudden contraction of the skin occurs and places the metal beneath this skin under heavy pressure, thereby lowering the recalescence point of the mass within. Hence, it could be expected that the substance would not be homogeneous; and this is proven by every day experience as well as by the micro-structure of the metal taken from various parts of the mass so cooled.

We are now prepared to answer a question of signal importance, and one that would not have found an answer had we not gone through the experimental evidence cited: What will be the effect of adding another substance to iron, in addition to carbon, say for example, manganese?

When fifteen or twenty per cent is present in steel or iron and such a mass is allowed to cool slowly no break is noticed in the cooling curve. Hence, we must conclude that such a mass, however cooled, should be hard. In fact, this is just what happens. But this is not only true of manganese as a component, but is equally true of other elements, and tungsten shows it in an even more marked degree than does manganese.

It is also known that red-hot iron is not magnetic, and experiments prove that the temperature of recalescence is just the temperature at which the iron ceases to be magnetic. But high manganese steels are also non-magnetic, hence the iron is present in the β stage. In the case of small percentages of manganese the conversion from the β to the α stage is retarded.

We might cite more instances of these peculiar phenomena, but it must be evident to even a superficial observer that the correct working temperature of the industrial use of steel is important, and it is not a matter to be trifled with. In this connection is seen the absolute necessity of an equipment, including high temperature thermometers, or, as they are technically termed, pyrometers.



TWO WAYS OF MAKING A SQUARE CORNER WITH ANGLE IRON AND A HOLDER

Working Angle Iron

Making a Square Corner with the Web on the Outside

Bert Hillyer

In the first place mark off the point at which it is to be bent. Cut the outside web straight across until you come to the root or heavy part in the corner. This allows it to be bent very easily but leaves a square gap that has to be filled in by welding a square flat piece in the space. There are two different ways of doing this. Each way is governed by the size of the angle iron. If the angle is small and a welding heat can be taken on each edge of the iron, both sides can be welded at once and a piece of good iron is scarfed and fitted to fill in the gap. But if the iron is big and wide the best way is to scarf and weld in the flat piece the same as if welding in a straight bar with a common lap weld. Cut off square with the outside web and weld up the other side which will be a long, narrow slot, scarfing both edges the same way so that a piece of round iron at a good welding heat will fill it up. In welding this slot it is best if the edges do not meet by 1/8 of an inch, as this lets the heat through just where you want it.

When welding angle iron or any wide, thin iron, place a fire brick on top of the iron. This keeps the iron clean, and dirt, which is one of the worst enemies we have in welding, cannot blow up and lodge on top of the iron. The brick should be fire-heated before putting on the iron, as this will help to draw the heat in the iron quicker. When the heated stock is placed on the anvil see that

it lays solid and level; see also that the helper hits it where it will do the most good. The writer has seen good heats spoiled by frantic striking and pieces not being held firmly on the anvil. The helper striking rapidly, with the pieces bounding around, sometimes hits one side of the weld, which being soft is torn loose again. Sometimes it is the little things that count, and holding the iron firmly on the anvil is one of the little things that counts in welding. Another important thing is to have the iron upset well so there is plenty of stock to work on and so that when finished the work will be smooth and as even as the rest of the bar. One mistake some smiths make is just upsetting the tip end of the bar and then, when scarfing, draw it down to the same size it was in the beginning. It is best to go back farther than the point of the lap will reach.

A Big Job and How It Was Done

Bert Hillyer

John Smith,
Passadum, Me.

My dear John:—I've got a job to make a large ring, 16 feet inside diameter, out of 1-inch by 5-inch iron. Kindly tell me the best way to do the job.

Yours sincerely,
William Brown.

William Brown,
Greentown, Mo.

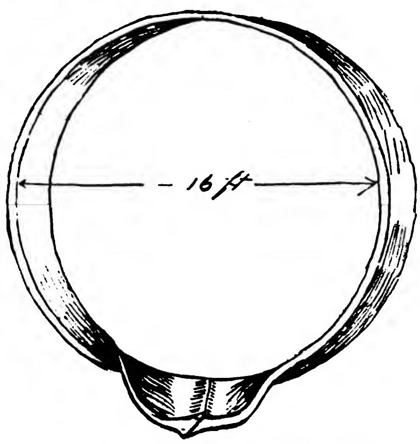
Dear Bill:—I got yours of recent date. Don't try it—can't be done. The ring is too high for the men or crane to handle. Even if you did get it welded, you could not get it out of the shop. It would be too big to get through the doors.

Sincerely yours,
John Smith.

Brown after reading the letter did some deep thinking. Sure enough, if it were made inside of the shop he couldn't get it out. So it was settled that it would have to be made outside. He therefore reasoned in this wise: "I can make a temporary forge outside and connect it with the shop blast by a rubber hose with a piece of pipe on the end. After welding three bars of iron together to make it long enough I will turn the tire bender over and strap it to a post, so that I can bend the iron while in a horizontal position instead of a vertical position. I will give the stock a twist with the bending fork about 6 inches back from the place at which it is to be welded. It will be easy to weld lying horizontal, and there will be no need of a crane. All I will need is sufficient help to lift it from the fire to the anvil. After welding I will heat it at the two twisted places and with two forks bend it back." Brown then proceeded to carry out his plans and made a good job of it. After the job was completed Brown wrote to Smith as follows:

John Smith,
Passadum, Me.

My Dear John:—I am enclosing a rough sketch of that ring—the job that "can't be done." I made the ring by bending the ends and welding it in a horizontal position. It took six men and they handled it with



HOW THE BIG RING WAS TWISTED

ease. I don't think sixteen men could have handled and steadied the ring standing upright. This time the man from Missouri shows you.

Sincerely,
William Brown.

Welding and Cutting with the Oxy-Acetylene Blow Pipe

G. M. Steward

We have experimented considerably and have had fairly good success in the welding of car roofs. We do this with a butt weld; underneath the welded part the roof is supported by a T-iron, formed to the contour of the roof. The sheets are inverted to the T, leaving the edges about $\frac{1}{16}$ of an inch apart and then welded. We also have experienced great saving in the manufacture of our window frames. These are pressed out of $\frac{1}{8}$-inch stock on the cornice break to the proper contour, mitred to the proper length and welded in the corners. This is done by having a cast-iron frame made the proper size of the window, the sections clamped to the former with about $\frac{1}{16}$ of an inch of the edges touching and then welded. We also use the welding apparatus on nearly all parts in the interior of the car that do not run below $\frac{1}{16}$ inch in thickness. We have had difficulty where we tried to weld anything less in thickness. There are a great many things we use the welding apparatus on, which makes it indispensable to us. We have made several experiments on heavy material, having one engine in service with a patch on the fire-box that required 74 inches of welding to complete the job, it being 54 by 10 inches. The writer is of the opinion that by persistent effort there is a great saving to be attained in the repairing of broken parts of machinery, of which we have done considerable, although we have made very poor success in our attempts to weld the softer metals, such as brass mouldings, etc.

P. T. Lavinder

The extent of the uses to which the oxy-acetylene can be adapted seems quite undetermined. Fields are opening up every day, each one more or less suggesting new opportunities. The attractive feature in the apparatus is the intensity of the heat and the apparent control with which it can be handled; still, like with many other projects, much lies in the skill of the operator, and this can be only mastered by the closest application and study of its numerous characteristics.

Some very unexpected results have been successfully obtained in the welding of machinery, of parts of locomotives, including truck frames, wheel centers and boiler sheets, hitherto handled by much more expesive means. During the short period we have had the plant we have done quite a variety of work; in fact, most any character requiring welding or cutting. Our machine was primarily purchased to see if we could not recover locomotive flue sheets by welding cracks developing in the bridges. Several experiments were made, the utmost care being given to the expansion we realized would surely take place and possibly disturb the weld, and while a number were successfully welded, the adjacent bridges broke down as we advanced

from one bridge to another. Experiments were made in the direction of heating a large portion of the sheet, but without success.

While this represents practically the only work in which we have been unsuccessful, the fact remains that the plant has several times paid for itself on account of the other uses to which it has been applied. The cutting out of a fire-box sheet, either for the renewal of the entire side or for patches of any size by hand is practically a thing of the past. This work is now being done very quickly and successfully by acetylene, and to give a better idea, a section of a fire-box sheet totaling up a cutting edge of 7 feet 6½ inches was cut out in a little more than a quarter of an hour, costing in labor 6 cents, whereas by the old process of cape chiseling it would have probably cost $3.75. The condition of the cutting edge was as good if not a little better than it would have been left had it been done by hand. At present all such work is now being done with the acetylene burner.

A very successful job of welding a patch in the lower portion of a fire-box next to the mud ring was made, the patch being about 5 inches wide by about 6 feet long, or nearly the length of the fire-box. After the work was done the engine was put in service and has been running successfully.

We have been very successful in repairing such parts as cracked jaws and flanges in fluted locomotive side rods, cracked rocker arms, eccentric jaws, lift shaft arms, valve stems, shaft hangers, spokes in cast-iron pulleys, rims of pulleys, engine truck frames, welding lugs in throttle chambers and steam pipes. With equal success we have taken care of many broken parts of machinery that we would otherwise have been required to renew.

While we believe that there are going to be a great many other opportunities to make use of the oxy-acetylene in cutting, welding and repairing, it resolves itself into a commercial proposition; that is to say, will the work last as successfully as if done in the old-fashioned way? we believe it will. Furthermore, everything seems to indicate that where the welds are carefully executed they have equal strength. The next feature, therefore, is the cost of labor, material and time. We have not kept in sufficient detail the repair operations we have had the opportunity to handle, but it is evident it is proving economical where it can be used to advantage, still each case is more or less a problem of itself.

On account of the grade of work now being handled by electric welding, and therefore the prominence that process is receiving, it may be that such a process has even greater advantages and greater flexibility than the acetylene. We have made no experiments with the latter, but the subject is receiving due consideration.

GEO. O. HARTLINE

By the use of this method a 14-inch I-beam may be cut in two in from 10 to 14 seconds, and large billets of steel may be cut in pieces in less time and at a smaller expense than with the saw. It has the advantage that irregular shapes may be produced as easily and quickly as straight lines with a waste of approximately ⅛ inch for each cut. Copper, brass, iron, or steel may be fused together or to each other as readily as the ordinary weld.

A number of railroads are using the oxy-acetylene plants for various purposes, including welding of machine parts, castings that would be expensive to reproduce, and sometimes hold a machine out of service a long time, waiting for parts to be replaced.

We repair and save a number of air-pump cylinders that crack in the steam and exhaust ports, weld foundry flasks cheaper than they can be patched. Weld blow holes in steel castings that show up after the castings are partly machined.

The question of successfully and profitably welding old fire-box sheets by this method is an open one. In my opinion sheets crack from excessive strain, crystallization, age, mud burns, and various other causes. Back flue sheets often fail from the continued and repeated strains due to rerolling or reprocessing the flues. Is the condition of the old sheet going to warrant our welding a patch during general repairs, or should we apply new sheets and have the assurance of an engine that will run in all kinds of heavy service from one shopping to another.

THE GENERAL POWER SHOP OF G. R. COOK AND SON IS THE ONLY ONE IN THIS KANSAS TOWN

Our experience in the welding of cracks in back flue sheets has been that the welds will not stand the severe strain produced by the flue prosser. A few cases lasted three months, others less than a week. We are now experimenting on several patches welded into side sheets, where the mileage of the engine would not warrant a new fire-box. I am unable to say how successful this will be, though the patches stood a 250-lb. test pressure.

The cost of cutting out fire-boxes has been reduced by the use of oxy-acetylene torch. This is done by cutting the two side sheets and crown sheets forward of the door sheet flange, also cutting out the corners of the fire sheets, so as to give a better opportunity to drive the mud-ring down.

This requires the cutting of approximately 40 feet of ⅜-inch and 8 feet

of ⅝-inch steel at the following expense:

3½ hrs. at $ .25 per hr.,	$ .87½
3½ hrs. at $ .23 per hr.,	.80½
270 ft. of gas at $ .02 per ft.	$5.40

Ordinarily it would require three boiler makers and five helpers one day to perform the amount of work to get the fire-box out, at a cost of $18.65. The saving effected by the use of the oxy-acetylene apparatus is $11.57.

Portable plants are used with wrecking cars for cutting apart the draw bar between engine and tender of engines that are derailed, also cutting apart of other heavy iron bars or rods.

In my opinion there are many places in the locomotive shops where the oxy-acetylene plant may be used to good advantage, though I am not prepared to say it may be used indiscriminately in welding fire-box sheets of heavy locomotive receiving general repairs.

How to Make a Bolt Header

The accompanying engraving shows the working drawings for the making of a practical bolt header. The original blue-print was contributed by Mr. R. B. Reiley, of British Columbia. The engraving is self-explanatory; all stock and parts dimensions being given and the materials generally being marked. Many readers will no doubt find these plans of practical use and value.

The Piece Work System in the Railroad Smith Shop

THOMAS M. ROSS

The establishment and maintenance of piece work in the railroad repair shop is one of the most difficult problems in the line of a foreman's duty. It calls for considerable executive ability and a great deal of patience and judgment and willingness to work hard to overcome any difficulty which may arise.

The foreman's first duty is to the company by which he is employed and, secondly, the men who are under him; but he must satisfy both of them. When introducing piece work in a shop great care and judgment should be used in getting up the first schedules to be put into operation as much of the future success depends upon getting the right start. It should first be used on work with which the men are familiar and for which the facilities for handling are good. It is then much easier to proceed with the more difficult operations. Confidence must be maintained and the men convinced that you intend to be fair with them; this can be done by the foreman taking the proper amount of interest and demonstrating by the men's own work that they will be the gainers in the end, and in this way secure the cooperation of the workmen.

In the matter of getting up schedules and creating piece-work prices we must be governed by the conditions surrounding the work and the facilities provided for handling it after it has been delivered to the workmen. In a well equipped shop you may be able to do certain lines of work for a great deal less than in other shops, and at the same time the workman will work harder and still make more money. The system of timing workmen to ascertain the cost of performing different operations is one which calls upon the foreman to use good judgment; he must take into consideration the condition of the material (if on repair work) and also the ability of the men or man doing the work, some taking more readily to one class of work than another, and also the willingness of the workmen and their ability to shirk when on work not already covered by piece work.

This brings us to the question: "Why Piece Work?" The time is not long past when there was a certain amount of rivalry among workmen as to who could do the most and the best work, and the man that excelled was looked up to as a sort of a superior or champion. Under such conditions piece work was never thought of, but at the present time this spirit seems to have given way to a desire on the part of a great many workmen to get all the money they can and do just the least amount of work the foreman will stand for. It is this condition which has compelled industrial concerns to adopt some sort of system of overcoming this difficulty and piece work is the result.

The proper distribution of piece work among the workmen is very important in that if any favoritism is shown it will sooner or later cause dissatisfaction among the workmen. In case some man may have a bad run of work in which he may do his best and still not be able to make out, it is then up to the foreman to see that this man gets on a line of work in which he can make up his loss on the bad job and made to forget his troubles. I have in use in my shop a system of keeping account of the earnings of my men by which I am enabled to so divide the piece work that all are getting as near their share as it is possible to give them. This shows the workmen that I am playing square with them and they do the same with me. We average 85 to 90 per cent piece work.

Piece work has the tendency to develop the inventive genius in workmen, as when given a certain price for doing a job, he begins at once to look for a quicker and easier way of doing his work and excellent results are sometimes secured.

Have your prices right, be fair with your men and have conditions the best you can, and Piece Work is a success; otherwise it is a failure.

GEORGE F. HINKINS

Establishing a piece work system is not a difficult job; it is a business proposition. All that is required is absolute fair play to the company and to the men. Be just to those above and those below; be fair-minded. There is not a foreman but likes appreciation from his superior officer. If any of you have brought out a new stunt that saves money for your company and your master mechanic or superintendent speaks of it in praiseworthy terms it makes you feel like doing some more, and then some. That is human nature. Your master mechanic knows when a word of praise is worth a dollar and when it produces a swelled head; a swelled head is a bad asset and anticipates a man's finish. Your master mechanic or superintendent has confidence in you; if he did not have, he would not employ you.

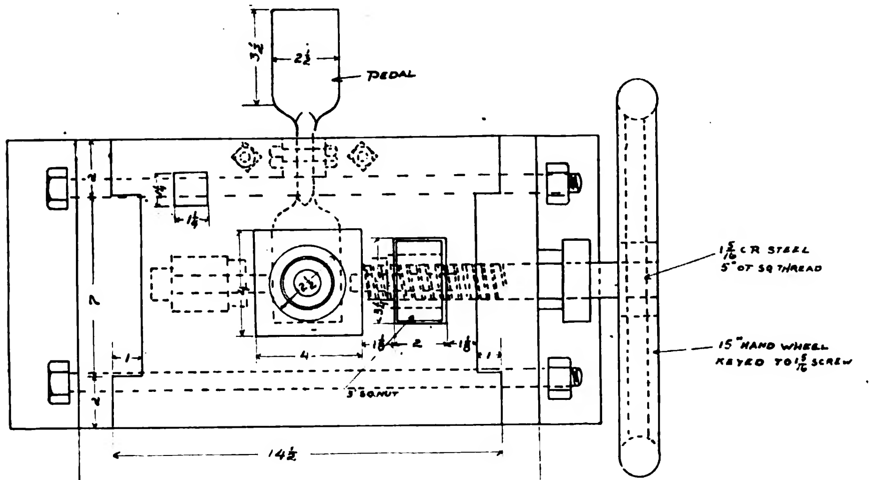
Now, you play the game the same way. Have confidence in your men, or rather, have men that you can have confidence in. More than all, if any of your men does a good job and in quick time, show your appreciation of the fact by telling him so. You know your man and know whether it will swell his head or stimulate the best and the good in him.

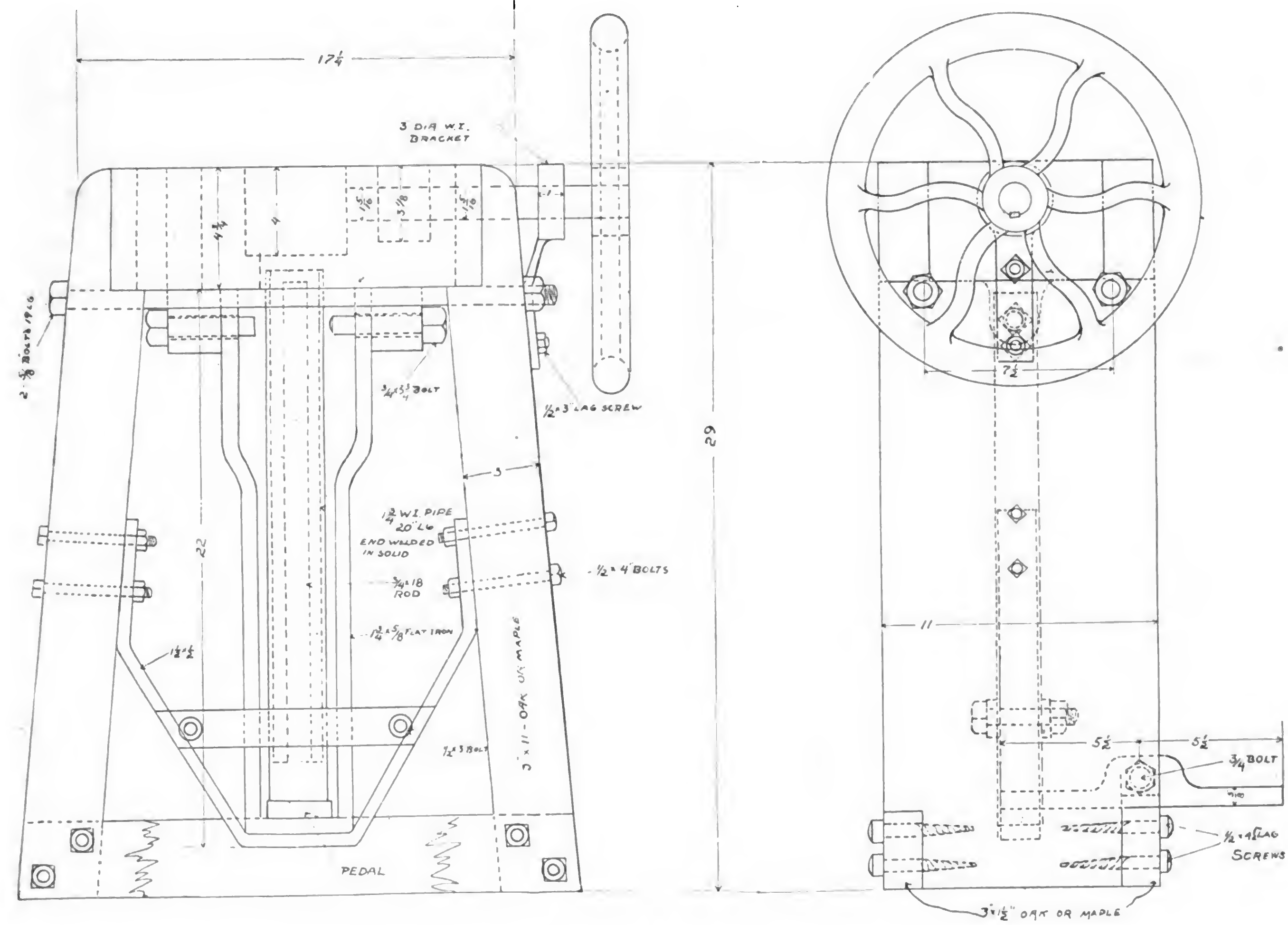
If appreciation was a salable or commercial article you would find

that fifty cents worth would bring one dollar in results; it encourages a man. Too often a deserving man is expected to take for granted the praise for his efficient work while if he commits an error he hears of it in ten minutes. Any foreman deserving peace of mind must stand honest criticism, quoting James Whitcomb Riley's opinion on that "he who does his best, gets more kicks than all the rest." It is a good thing to be "called;" it "shows you up" and shows whether you are bluffing or holding a good hand.

Now, as to piece work. I do not care whether you call it "piece work," "contract work," "premium plan" or "bonus system," it all amounts to the same thing. It is only a question of how much product can you get for a stipulated amount of money and how much is your company willing to pay. A man can do as much work for one dollar as he can for five dollars. A shoe dealer can sell a five-dollar pair of shoes for one dollar. Now this is a case where there is a money loss in either case. Now you can give a man five dollars for one dollar's worth of labor, and you can give five dollars for a one-dollar pair of shoes. This is also a case where there is a money loss in either case. Now, if the seller and the buyer understand their business there will be no money loss in either case, but will be a business transaction and one that will be satisfactory to both parties. Shoes are sold for profit; shoes are also purchased for profit if you wish to get full service as to wear and tear.

Piece work is also for profit; it increases production and at lower than day-work cost. It means less men and less machinery to get out a given amount of product. It is a profit to the workman, as he makes a profit over his day rate. Not only that, he must make good any inferior work as that is in the agreement. Piece work is the only right and just



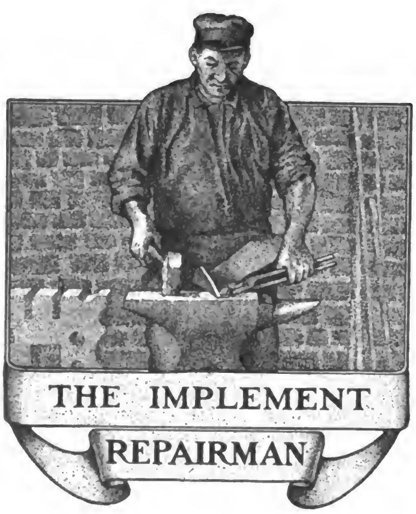


WORKING PLANS FOR THE BUILDING OF A PRACTICAL BOLT HEADER

way to reward an industrious man for his efforts. Furthermore, there is no dispute about how much work a man should do in a given time. The price is set with justice to both parties, and it is up to the man to make good. It is not so with day work. Day work will always cause more or less misunderstanding between the foreman and some of his men as to what constitutes a day's work. It is a source of friction. My men, all of them, want piece work simply because they need the extra money and my company wants the product.

There is no benevolence about it, it is simply a business transaction. As to the best method for setting piece work prices that is up to you. Piece work, however fine in principle, will not work automatically. You must use good, capable management and be guided by sound business judgment.

Herman Schnider, Dean of the College of Engineering, University of Cincinnati, aptly puts it when he says, "A knowledge of the limitations, the weaknesses and group subtleties of men is as requisite as a similar knowledge of material." It is how to harness all the forces to bring about new economies which is nothing more than human and mechanical efficiencies.



Forging a Hammer

W. Gillespie

In forging a hammer I follow much the same method as Mr. Bagley, except that in place of taking square steel I use octagonal stock which must be ¼ inch larger than the square stuff. I heat the bar and punch the eye hole, being very careful to have it straight both lengthwise and sidewise. I drive in the drift pin and fuller the eye about ⅝ inch wider than the diameter of the face of the hammer. If you follow this method you will not have much trouble with the handle coming loose or breaking. Be sure the eye is big enough for the size of the hammer you are making. I next fuller in the small end, being careful that it doesn't gall in any way; the face end is treated in the same way. I round up both ends, have it almost finished and then cut it off the bar. By leaving it on the bar you don't have to use the tongs until the last operations. Using octoganal steel requires much less work than does the use of square, as it is not so liable to run into cold shutes or galls. I harden only about ¾ inch face end of a hammer, leaving the eye as soft as possible.

How to Solder

The Requisites, the Apparatus and the Method

Henry Moore

Motor

Four things are essential for good results in soldering: A well-tinned iron, clean surfaces to be joined, a good flux and a sufficient supply of clean, sootless heat.

Dirt or grease in any form seriously interferes with the operation, and if on the iron, is carried direct to the parts to be acted upon. File the soldering iron to a point, heat till it will melt solder, and then rub briskly in a mixture of solder and resin, on a piece of tin or a brick. A brick kept for this purpose will have a hollow on its upper surface, in which is a pool of resin and solder. It will take a little patience and perseverance thoroughly to tin the iron, but it is time well spent. Have a piece of slightly dampened cloth handy, and, just after taking the iron from the heater, wipe the oxide off the faces.

Bear in mind always that the surfaces to be soldered must be absolutely clean. On automobile repair work oil or grease is apt to be present, and under the heat of the iron it will run into all the cracks, rendering it impossible to make the solder adhere. Consequently, the parts should be thoroughly washed in gasoline far beyond the limits of the work. Scraping and filing should be resorted to instead of cleaning with emery cloth.

After the surfaces are mechanically cleaned, they should be treated with a flux. There are many "patent" kinds on the market, but the old-fashioned "cut muriatic" acid seems as reliable as any. Put some pieces of zinc into a tumbler and pour muriatic (hydrochloric) acid on them and add an equal amount of water. Allow this to stand until the bubbling ceases—in order to insure all the free acid being taken up, there should remain some zinc undissolved. Keep any fine tools beyond reach the of the fumes. When all action has ceased, decant into a bottle. After the article to be soldered has been cleaned by hand, apply the mixture just described with a brush or a small stick cut to proper shape. After the flux has been on for several minutes wipe off with a clean rag, and the cleansing effect can be noted. Then apply a very little of the "acid," and the surfaces are ready for the solder.

There are many ways of supplying the heat necessary for the operation of soldering, from the kitchen stove to the oxy-hydrogen or oxy-acetylene blow pipe. The first method is too crude for consideration, except in emergency; the last is hardly within the reach of amateurs. Probably the gasoline torch is the most commonly used medium, though some object to it on account of the possible danger, and it can cause great damage in unskilled hands. It is handy, and where the mass of metal is large, is useful in bringing the temperature up to the soldering point. The heat of the iron alone is sufficient for thin brass or copper work, such as is most commonly found in automobile repairs, and anything so large as to require a great amount of heat should be brazed.

In using the gasoline torch on complicated work, such as radiators, the heat is apt to go far beyond the points intended. For this purpose, and indeed for all light work, a Bunsen burner arranged as shown is ideal.

Connect the burner with a gas jet by means of tubing, copper where possible. Have the last part of rubber, long enough to give sufficient play. Construct an L-shaped arm, one end revolving, but not sliding, on the neck of the burner, the other holding the soldering iron firmly at the proper distance above the burner. This point is in the upper part of

the pale blue cone of flame. The arm as shown would be a clever piece of work to turn out, but a good working substitute may be made from heavy iron wire.

The advantage of this arrangement is that the heat can be regulated so that the iron is kept at a constant temperature, allowing the finest kind of work, as the point of the iron conveys the heat only to the exact spot desired; and owing to the fact that the flame follows the iron, no time is lost in reheating it. The Bunsen burner gives a good, clean flame, ample to heat the ordinary sizes of irons, and may be used simply to heat the iron, without being attached for constant work.

The only drawback to this device is that a gas jet or tank of some sort must be at hand. But most automobile parts that are soldered are removable, and generally require to be taken from the car to make a first-class job. For radiator repairs the above device is wellnigh perfect.

Wire solder is the most convenient for ordinary work. Easy to handle, it can be pointed right at the spot to be treated and takes but little heat from the iron. After cleanliness the great thing is the temperature. Factory work is so perfectly done because it is all done at once. The articles are fresh and clean to begin with, the temperature of the whole part is raised to the proper point, when entire seams may be run at one stroke of the iron. Repair work is patch work. Only the spot to be treated should be heated sufficiently to melt solder, otherwise it may run out of parts not necessary to disturb. If possible have the work so placed that when the solder does melt it will not run, but lie in position. If everything is perfectly clean there will be no break between the old and new work. If there is the slightest dirt present the old solder will "flow" ahead of the new solder and prevent the seam being perfect.

Joints like unions should be "wiped." At a certain temperature the solder will be plastic and can be moulded with the hands, using a cloth. There is a knack in this which will come only with practice.

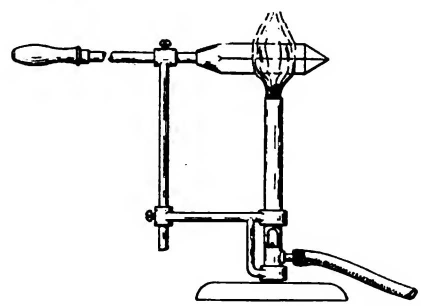
The iron will hold on its point a considerable amount of solder, often enough for the particular bit of work in hand, and can be coaxed to pick up small particles if care is used. A much neater job is usually made if the solder is flowed off the point, instead of being melted off the stick in lumps.

Strict attention to absolute cleanliness and the proper temperature will make success sure; "pretty good" is never good enough.

Spring Making, Repairing and Tempering

H. D. Wright

Manufacturing springs by machinery is the only way to handle springs when large quantities are to be made. It would pay any company with one hundred engines to put in a spring plant with modern machinery, for there is a saving of from fifty to seventy-five per cent. There are railroads that are manufacturing springs, and in some of their springs they are saving more than seventy-five per cent.



A COMBINED HOLDER AND HEATER FOR THE SOLDERING IRON

On the L. & N. Railroad, at South Louisville, they enlarged their spring plant, and I am sure that Mr. T. H. Curtis, Superintendent of Machinery, would not have allowed Mr. F. F. Hoeffle, General Blacksmith Foreman of the L. & N. Railroad, to have enlarged the plant if there wasn't any saving in it. Those who have the modern spring departments should think themselves in good luck, for when they have modern machinery they can show the company what can be saved in repairing and making springs. However, this does not appeal to the brother who has no modern machinery, nor will his company entertain any conversation on buying any. But he has springs to make and repair and he says, "I am always tied up on springs; I can't get my output. I can't put on another spring maker—I have not the room." I would say in that case put the spring-maker on piece work and the output will come. The same system will serve one the same as the other, whether they have modern spring plants or not, in receiving stock.

When you receive your steel make a test right away with each size and that saves trouble in tracing back requisition numbers, car number, when it was shipped and received, for, as a rule, the store department does not care to be bothered shipping back any inferior stock. We generally are asked "Can't you work it into something else?" But don't let this get into your spring steel rack, for trouble commences as soon as it is unloaded.

In making main plates the style of main plates as a rule comes from the Mechanical Engineer. We are using malleable clip and they give good results.

When welding on clips there is a possibility that the steel may be overheated, and even if the steel has been brought up to a welding heat, it does not refine the steel any. I have watched the breakage of welding clips and most of them are broken from ¾ to 1 inch back where the scarf is welded down.

When drawing out plates they should be either rolled, drawn out on an oval tool under steam hammer, or on an oval die under a Bradley hammer. If drawn by hand be sure that the face of the sledge is smooth and has no sharp corners on it. Flat dies under both steam or Bradley hammers leave creases and if the rolls are not properly adjusted on long tapers this will also cause creases, and, worst of all is the sledge. These things should be watched and avoided, as all creases are breaking points. After main plates are made all plates are nibbed, trimmed, and we are now ready to set and temper. In setting springs I generally leave the first and second plate stand off from $\frac{5}{16}$ to ⅜ of an inch, giving them a gradual taper to the top plate, leaving no set in the top plate, and see that every plate is properly fitted to every other one.

Tempering

This is a vital point in a spring. The temper in a spring is like the heart of a man. If there is anything wrong with the temper the spring does not last long. I try and get the plates in the oil with as uniform heat as possible and a bright cherry red heat; then we draw them back, and if you will watch real close when you put the plates back to draw you will see the oil begin to check. At this

time take the plates out of the furnace, give them a little tap with the hammer and all of the scales will fall off and your plates are blue from one end to the other. Don't dip them in the oil again; lay them down and let them cool off. They are then easily fitted with what little heat there is in them.

In testing it is best to test the spring before the bands are put on. You save bands sometimes and the time knocking the bands off and putting them on again.

For making bands the forging machine is the most satisfactory way for making bands, both for quantity and economy. When bands are pressed on by hydraulic power it is not good practice to cool them off, for it puts too much strain on the band. It does no harm, however, to cool them off when pressed on with air machinery, but in putting them on by hand give the spring-maker help enough so that he can get them knocked down and into the water as soon as possible, for they will not be any too tight at the best.

These are methods that I have followed in spring making, both with modern machinery and where I had nothing but a sledge, and my trouble with springs is the least thing I have in my shop. I generally make my own spring-makers.

Opinions differ in regard to the tempering oil. I have found but little difference. I use fish oil and my springs give good service. In speaking of compounds mixed with water, I have not received just the right answer on durability of the springs that are tempered with compounds to recommend it. There are too many changes in the water. For example, watch the scales that come from your stationary boilers and that will show you the difference in water, and this is the trouble that exists in compounds.

The Magnitude of the Farm Machine Trade*

Professor J. E. Waggoner of I. H. C. Service Bureau

Since the invention of the reaper more advancement has been made along all lines of human endeavor than for hundreds of years—yes, thousands of years before. Modern implements have so loosened the strings of absolute necessity in fields of production as to permit the few to clothe and feed the many, thus changing us from strugglers for the bread of mere existence into a people free for the pursuance of science, literature, invention, etc., etc.

It took the farmers in the time of Columella four and three-fifths days to do the actual work involved in growing a bushel of wheat; in 1830 it took three hours, and now, in the Roosevelt age, it takes but ten minutes. In 1830 the labor per bushel of wheat cost 17¾ cents; in 1896 it cost 3½ cents. One third of our people are now able to supply food for all and have a remainder left for reserve and export. What greater tribute can be given to modern agricultural machines than that they have so solved the problem of food supply as to advance our people from a life of drudgery to the very forefront of the most progressive nations in the world.

Improvements have not stopped—every day is marked by new inventions and new developments. Well it is that this is true, for each of the past few years had shown a decrease in our export trade of food stuffs and an increase in our population. We now have seven mouths to feed where in 1830 there was one. Our present population has reached the enormous total of ninety or more millions. It is estimated that in 1920 the population will be 120,000,000 and in 1950, in round numbers, 200,000,000 This will mean that many times the amount of food stuffs now produced will be required to supply home demands.

In this connection it may be of interest to know that the estimated area of reclaimable swamp lands in the United States is less than 80,000,000 acres. This, together with the still untilled lands in the irrigated districts of the West, will provide homes for our increase in population not to exceed 12 or 15 years. You may ask what has all this to do with farm machine trade? It means that the crude methods of the past which have robbed the fields of their fertility will have to be supplanted by more economic methods of farm management and more practical methods of agriculture. This will require a deeper and closer study of the means and methods of production. How important a role farm machines will play is to be determined, and in this connection we can impress on the Agricultural Department the need of thorough and careful investigation.

Readjusting our viewpoint according to the American yard-stick—namely, money—for determining the utility of a commodity, we glean the following interesting facts from the late census report:

He'll have to use shorter oars to get through the narrows.

With Apologies to Farm Implement News.

The increase in the value of farm products as a whole shows very markedly a close relationship to the increase in the amount and value of farm machines on the farm. Of course, in some sections of our country this is more noticeable than in others. In the Central Northern States the increase in the value of land has been practically proportional to the increase of farm machines used. We are unable to obtain reports from all the states, but in the 26 for which the statistics have been compiled there is more than $802,000,000 worth of farm machines now in use. To resort to a more graphic method of presentation, we can say that the value of farm machines in the United States is sufficient to dig three or four Panama Canals, or to purchase one and one half times the taxable property in the good State of Georgia. Our farm trade does not

*Extract of paper read at Covention of National Gas and Gasoline Engine Trades Association at Detroit, Mich., June 21.

begin to stop here, for the farmers in all sections of the world are looking anxiously to our manufacturers for the supply of efficient and practical farm machines. The export trade for the month of March, 1910, amounted to millions of dollars—three quarters of a million went to Canada, one and one half million to Russia, one half million to France and one third of a million to the Argentine Republic. This is only a glimpse of the vast possibilities and extensive demands of foreign countries for American-made implements. The immediate future for the demand of farm machines is exceedingly encouraging. The American farmer is investing in farm machines from 20 to 25% of his annual earnings, which in money will amount to millions of dollars. Especially is the future bright for the farm-power phase of the trade.

The fields of agriculture has been last to feel the need of mechanical power and its application covers such a wide range of uses that the work has hardly passed beyond the experimental state. First one form of power and then another has been developed to meet the demands and needs resulting from the advance of civilization. The sturdy and trustworthy ox has in most instances been supplanted by the horse, but owing to the very nature of this form of power the efficient limitations were very quickly reached. In some cases it is true that one man can handle a large number of horses, but, ordinarily speaking, four to six-horse-power per man is the exception, not the rule. In opening up to modern methods of farming the vast areas in the South, West and Northwest the American farmer has been seriously handicapped by the lack of efficient and sufficient power, in spite of the fact that the number of horses has increased fifty per cent the last ten years. The only logical recourse is some kind of mechanial power which will enable one man to direct the application of sufficient energy to accomplish the same work that now takes several men to do. It is true that this problem has been partly solved by the tractor, both steam and gasoline, but the field is broad and the demand growing.

By the use of efficient mechanical power it has been demonstrated that man is able to do work for about sixty per cent of the expense required for the same amount of animal power. The question has been raised as to whether or not mechanical power will work satisfactorily in connection with the latest improved methods of agriculture. There is no reason why the most up-to-date methods cannot be successfully followed when such power is used—it is only a case of one man handling the power that formerly required three or more. The evil effects claimed by some of the heavy tractor on the soil are yet unauthenticated and considered by many more theoretical than actual.

To give you some idea of the vast field that is yet practically untouched, so far as meeting the actual needs of the country, we will point you to the South where there are over 468,000 square miles of tillable land lying within those states that until recently, were considered timber states. The new South, practically speaking, is no longer a timber country, but is truly an agricultural South. The presence of the pest known as the boll weevil promises to revolutionize southern agriculture, resulting as it must in the diversification of crops which in effect means the use of more and better farm machines and more power. Doctor Knapp, known as the father of demonstration work, has repeatedly made the statement that the products of the southern states could be increased 800 per cent by the application of practical and modern methods of agriculture. Three hundred per cent of this is accredited to the use of improved farm machines and the use of more mules. The latter can and will be largely replaced by mechanical power.

In the West dry farming is in its infancy. Professor Campbell writes us to the effect that there are more than one and one-half million square miles to which his methods of soil culture are applicable. This vast field is practically unproductive at present because of the lack of proper machines for tilling the soil. On the model farm of Professor Campbell's at Holdredge, Neb., 25 bushels of corn were produced per acre last year, while on the ordinary farm in that section the corn was a total failure. The Professor says if there had been mechanical means of quickly cultivating the large areas the yield could have been increased 50 to 100 per cent. The principles of dry farming necessitate the cultivating of the soil at the proper time after each rainfall. If the land is allowed to remain uncultivated it not only loses the principal amount of the rain, but its condition is such as to hasten the evaporation of the soil moisture. By being able to cover large areas in a short time this loss could be prevented. The only practical way of accomplishing this is to provide mechanical means whereby one man can cultivate ten or more acres instead of one. The future of this vast semi-arid section from an agricultural standpoint depends very largely on the future development of power machines. These may be one of two types, built either so as to be attached to a tractor or light machines carrying their own source of power. Either field is broad enough in its scope and promising enough in its possibilities to challenge the attention of capable and ambitious men. Other than the application of power in farming these acres the farmer in the Corn Belt in the older settled section is fast learning the need and convenience of mechanical power in performing the ordinary tasks on the farm. The gasoline engine, often dubbed the "hired man," now performs many of the menial tasks of the farm such as grinding feed, shelling corn, pumping water, etc. And now there opens up the vast field of applying gasoline power to the individual machines of the farm. The model farm power house is at present actually to be found on many farms and its necessity is being realized more and more as its practicability is becoming known.

In closing we wish again to direct your attention to the real worth and importance of agricultural machines in the advancement of our people. The invention of the reaper—the entering wedge leading to the necessity of perfecting the internal combustion engine, and the development of agricultural implements, has planted more mile posts along the march of progress and liberated more people from the clutches of poverty than have the fierce struggles on battle fields and the fervent appeals of renowned statesmen. The memory of our inventors should grace the hours of our reflections and their achievements be emulated in the halls of our endeavor for Invention is the real advance guard of progress.

A Spare-Time Job

When you've got a few hours' spare time try this procedure with your shop walls: Dump a half bushel of quick lime in a good tight barrel, add enough boiling water to cover it to a depth of six inches and cover the barrel to keep in the steam. When finished boiling add water to make about the consistency of cream, and then add two pounds of sulphate of zinc and one pound of common salt. Now add water enough to make the mixture spread easily with a paint brush and after stirring thoroughly apply to the interior shop walls.

AROUND OUR FORGE FIRE

"Hello! Mr. Editor," exclaimed Benton upon entering the "forge-room" and dropping into his favorite chair. "What is the feature subject this month?" he asked, picking up the proof-sheets for the current issue.

"We feature machine and tool smithing this month," returned the Editor, laying down his pen and turning about in his chair. "You'll find several articles featured there that will be of vital interest to machine and tool smiths while other departments are by no means neglected."

"When do you get out your manual training issue?" questioned Benton.

"That number comes out next month," returned the Editor. "We've got about all the material gathered for it and it promises to be surprisingly good."

Jack Hamilton came in at this point, and upon seeing Benton he said, "You're just the man I'm looking for, Benton. I'm up against a proposition that has me pretty well puzzled. The boss sent me some pieces of cast iron the the other day and asked me if I could copper-plate them. Well, I didn't know how to do it and I couldn't find anything in my books on the subject, so I came to the conclusion that Benton was the man to see."

"Have you got a plating outfit at the shop?" queried Benton.

"No, we haven't a plating bath. You see, we have no need of plating any of our stock. We have a galvanizing plant, but have no call for any other plating." Hamilton also said that there was little likelihood of his having to do another job of copper plating again in some time so there was no need of getting a plating outfit for the present job.

"I think I've got something in my first book that will just fit your case," said Benton, taking down his old receipt book and turning its leaves. "Here we have it," he said at last, beginning to read in his usual sing-song manner. "First prepare a bath of 50 parts of hydrochloric acid with a specific gravity of 1.1 and 1 part of nitric acid. Then prepare another bath composed of 10 parts of nitric acid and 10 parts of chloride of copper which has been dissolved in 80 parts of hydrochloric acid. Now place your pieces in the first bath, then transfer them to the second bath; now rub the pieces with a woolen cloth or buffing wheel and immerse them again until the proper deposit of copper is had. That," continued Benton, closing his book, "will enable you to plate your cast iron pieces with no great amount of equipment and will no doubt suit your purpose as well as a plate made in the regular way."

"I think it is just the thing I am looking for," returned Hamilton and with a hearty "thank you" he went out.

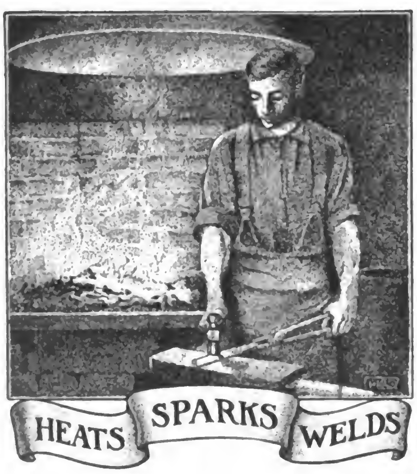
The Talking Horse

An odd rhyme by Walt Mason, sent in by Mr. Fred. L. Rowe. It will, no doubt, be of more than passing interest to our readers.

A horse brought to an evil pass
Was given speech like Balaam's ass,
And it remarked in mournful tones,
While rude winds chilled its ancient bones:
"My master sits beside the fire,
And there he'll talk and never tire
Of equal rights, square deals and things
Of which the jawsmith always sings,
And I stand haltered to a post,
Almost ready to give up the ghost.
I wouldn't give a picayune;
I wouldn't give a mouldy prune
For any scheme of equal rights
That leaves dumb critters out at nights.
The squarest deal that man can plan
Is framed exclusively for man.
While he is fussing with his jaws,
Devising tax and tariff laws,
He lets his poor old pony wheeze,
He lets his trusty rooster freeze,
His cow must shiver by the fence,
Because he has no residence;
His dog must sleep beneath the barn,
And never does he care a darn.
I wish the world were changed around,
And horses had the right to pound
And bullyrag and to starve the men,
You'd see some dizzy doings then.
My boss would stand here nice and cool,
And I'd be in there playing pool,
Or sucking cider through some straws
Or arguing some blame-fool laws."

* * * * * * * *

Then having told what he desired,
This poor old freezing horse expired.



He who has a "grouch on" is mighty poorly clad.

How's your insurance? Don't wait until after the fire to find out.

There's more difference between a dream and a plan than mere spelling.

When a smith is set in his ways he is not very likely to hatch out anything new.

The wise man plans for tomorrow, but the foolish never do anything till tomorrow.

There's a whole lot more to tool forging than simply heating the metal and pounding it.

With good brains, good materials and good tools what can possibly keep success from your doors?

Work like a slave if you will, but it's not necessary in these days of power and modern labor-saving tools.

Certainly your business will stand driving, and it will surprise you what a lot of driving it will stand without balking.

Fear of failure never brought success. It's rather the determination to succeed despite failure that finally gains the goal.

Don't make "spring fever," "dog days," "hot wave," "cold weather" or "holidays" an excuse for neglecting your business.

How's your supply of pink buffaloes? Better send for a new lot if your supply is low. Of course, you are using them freely.

When you want to do a difficult job easily do it as soon as possible—the longer you put it off the more difficult it becomes.

The more we know the more we know what there is to know about a subject. And how true that is of blacksmithing.

It's as necessary to exercise the brain as it is to exercise the body. Both body and brain shrivel and shrink from inactivity.

Appearances aren't everything. The pea fowl is a beautiful bird, but there's more demand for chicken eggs than for pea fowl eggs.

'Stead of knocking your competitor and his work make him jump by putting all your energy, knowledge and skill into your work.

Can you care for a side-line? You'll find several suggested in the advertising pages. Better look them over carefully and turn spare time into profit.

Wonder what our friend Tom Tardy's been doing? He says, "It's easier to lose ten dollars on a horse race than to earn ten cents shoeing horses."

It's well worth your while to turn out work a bit better and a bit earlier than is called for, and many a business has been built on just such a foundation.

Stimulate your trade by giving five per cent discount for cash. Some smiths say it solves the long-credit problem. Trt it—in any event you'll be the gainer.

"That Sewing Awl is all O. K.," writes Brother George F. Flagg, of Colorado. You can get one of these awls by sending in a new subscriber. Better do it now.

The man who knows the most doesn't always make the biggest success. It's the chap who sticks closest to his job that has the better chance for making good.

Don't be afraid to start small. No man on earth has yet been able to start at the top and stay there, and it's better to start at the bottom and work up than to go the other way.

Ask your jobber about American Blacksmith Subscription Coupons. They make subscribing and renewing easier for you; and they insure you against the swindler and faker.

When you fail to file a catalogue you fail to file a book of valuable trade information. Keep your catalogues where you can get at them—when in doubt they'll tell you where to buy what.

How much money do you want to save? You can save a good-sized lump by taking advantage of our long-time rates and the exact amount depends upon just how much you want to save.

It's not so much the amount as the regularity and persistence with which you put something by. It'll surprise you how quickly a little bit each day or week will amount to a good-sized sum.

Some smiths seem to forget that their one and only reason for being in business is profit, while others allow the sight of profit to blind them to their obligations and promises to customers.

Make a point of handling everything that comes your way. When you turn away a job you can't handle properly the other jobs go with it. Make a specialty of handling everything in your line.

It's time to get a better price when the cost of supplies goes up and your profits are cut down. Let your selling price grow with your costs. You can't do business permanently unless you do.

Do you wait for new folks to call on you or do you make a business call as soon as they're settled? Get ahead of your competitor by making a practice of calling on new comers as soon as possible.

Follow up your customers' promises for payment of bills. You can't expect them to pay promptly unless you make them understand that a promise to pay on a certain date is a real promise and must be kept.

Here's a pretty good motto to adopt and to live up to: Do good to those who hate you and pretty soon they won't. Can you imagine the devil having anything to do with the man who follows that doctrine?

Are you intimately acquainted with your selling prices? Don't be content with a mere passing acquaintance. A selling price is made up of two parts—the cost and the profit. Be sure you are thoroughly acquainted with both.

The best time to handle a man is when he's a boy, and the best time to present your bill is when its young. It's as difficult to teach an old dog new tricks as it is to collect an old, long-over-due bill. Get after 'em while they're young.

The old veterans of the craft are still studying and learning. The man who thinks he knows it all is the chap who has spent about three months at the trade. The veterans of forty and fifty years' experience are just beginning to learn how limited their knowledge is.

Don't think you can injure your neighbor's business by price cutting—and you certainly don't suppose you can make more money by cutting prices! If you want more business advertise and push honestly for more trade. Keep continually and everlastingly at those you want as customers.

Carelessness will wear out more tools and equipment than actual use. Look after the equipment properly. But don't go to the other extreme of attempting to patch up equipment already worn out. There's no economy in that. Buy good tools, give them good care, but when they are worn out get new ones.

Give the future craft a square deal by dealing squarely with your apprentices. Start him right in the trade with just the very best that you can give him. Teach him the trade thoroughly—its ins and outs, its pitfalls and snares, its possibilities and opportunities. A square deal for the apprentice means assurance for the future craft.

Look out for the fake subscription agents! There are several of them operating in different sections. When an agent cannot show written authority from the publisher of the paper whom he pretends to represent it may not be a bad idea to have his case investigated by the police authorities of your town. But in any case it's safer, folks, to mail your money direct to the publisher. We don't want you to lose any money, so look out, folks.

EXTRA! EXTRA!

New Name Heads Honor Roll

A new name appears as head of Our Honor Roll. Mr. I. J. Stites of New Jersey has forced Mr. Crisler into second place and holds a lead of just three years, Mr. Stites being paid-up to January 1923. This move in the honor roll contest promises to lead to some still more exciting changes at a near date. Already several of "Our Folks" have inquired regarding a life subscription rate. So watch this column for later developments. And in the meantime don't forget that Our Long-Time Rates make a position on Our Honor Roll easy. Here they are:

	U. S. and Mexico.	Canada.	Other Countries.
Two years	$1.60	$2.40	10 shillings.
Three years	2.00	3.40	14 shillings.
Four years	2.50	4.35	18 shillings.
Five years	3.00	4.90	1 Pound.

And when you ask a neighbor to subscribe show him this list. A paper with such a list must be valuable and practical.

I. J. Stites, New Jersey........Jan., 1923
R. S. Crisler, Kentucky.......Jan., 1920
T. P. Considine, Massachusetts.Dec., 1918
Richard Brenner, Texas........Feb., 1918
Walker Bros., New Zealand.....Feb., 1917
C. J. Hall, Washington........Dec., 1916
R Sommer, Australia........Sept., 1916
H. M. Larsen, Wisconsin.......July, 1916
Geo. P. MacIntyre, Maine....July, 1916
Chester Humbert, Wisconsin..June, 1916
Lincolm Underhill, California..June, 1916
M. Broton, North Dakota......June, 1916
C. H. Cairns, New York........May, 1916
P. V. Johnson, Ohio...........May, 1916
F. E. Smith, Vermont.........May, 1916
C. A. Stebbins, Kansas.........May, 1916
D. E. McDonald, Florida.......April, 1916
James Baxter, South Africa...April, 1916
E. P. Dignan, South Australia..April, 1916
W. H. Winget, Vermont......April, 1916
George Howard, Kansas.....March, 1916
G. N. Follmar, Nebraska.....March, 1916
W. Willoughby, Michigan....March, 1916
H. Hoffmeyer, New Jersey....March, 1916
Frank L. Locke, New York...March, 1916
Frank L. Evarts, Connecticut.March, 1916
C. R. Winget, Vermont.....March, 1916
Hugh & John Chisholm, N. Z..March, 1916
C. F. Molkenten, Australia...March, 1916
E. P. Jones, Kansas...........Feb., 1916
A. Tillman, California.........Feb., 1916
C. K. Cornelison, Pennsylvania.Feb., 1916
M. Klitgord, New York...... Jan., 1916
O. Stenning, South Dakota......Jan., 1916
Iver Johnson Arms and Cycle Works, Massachusetts.......Jan., 1916
Feldmeyer & Schaake, Kansas..Jan., 1916
Jas. A. Sharp, Massachusetts...Dec., 1915
J. Krahulec, Illinois.......... Dec., 1915
P. E. Dahlfurst, California.... Dec., 1915
Wm. Bisher, Ohio...........Dec., 1915
C. A. Jerner, Nebraska.......Dec., 1915
G. S. Fisher, Nebraska........Dec., 1915
Printers Supply Company, Nebraska...................Dec., 1915
M. Kennedy, Tasmania........Dec., 1915
Williams & Turner, W. Virginia.Dec., 1915
C. J. Ash, Kansas............Dec., 1915
F. H. Joslin, Massachusetts.....Dec., 1915
C. W. Ames, Massachusetts.....Dec., 1915
C. L. Sorensen, Nebraska.......Dec., 1915
E. Williams, New York...... Dec., 1915
W. Urquhart, New Zealand.......Dec., 1915
W. Rupe, Oklahoma..........Dec., 1915
L. S. Kocher, Iowa........... Dec., 1915
D. Codere, Illinois.............Nov., 1915
F S. Woody, Iowa.............Nov., 1915
George H. Ilsley, Massachusetts.Nov., 1915
M. I. Huff, Missouri..........Nov., 1915
Stephen Wachter, Pennsylvania.Nov., 1915
C. C. Perry, Australia.........Oct., 1915
Sidney Stevens Imp. Co., Utah..Oct., 1915
W. H. Findlay, New Zealand....Oct., 1915
R. F. Watson, California.......Oct., 1915
H. R. Stone, Connecticut......Oct., 1915
F. Teuber, Georgia............Oct., 1915
Ed. Hammill, California.......Sept., 1915
R. D. Simkins, Pennsylvania...Sept., 1915
T. J. Reynolds, Pennsylvania..Sept., 1915
Wm. Bates, Texas............Sept., 1915
J. Knight, England...........Sept., 1915
L. F. Kuhn, Mexico..........Sept., 1915
A. Chargois, Queensland, Aus...Aug., 1915
A. M. Byfield, West Australia...Aug., 1915
C. E. Allen, Nebraska..........Aug., 1915
M. J. Roder, Montana.........Aug., 1915
J. E. Lyon, Texas.............Aug., 1915
F. W. Krenz, California.......Aug., 1915
Jos. P. Rotolinski, Massachusetts.Aug., 1915
Jas. A. Buchner, Michigan.....July, 1915
G. N. Ferree, Utah...........July, 1915
T. O. Chittenden, New Zealand..July, 1915
The Goldfields Diamond Drilling.. Company, Australia..........July, 1915
J. A. Lawton & Sons, South Australia .... July, 1915
I. Murray, South Australia.... July, 1915
J. W. Ivil, Utah............. June, 1915
E. L. Herving, Florida........ June, 1915
G. R. Twedell, Mississippi....June, 1915
Van den Wildenberg Brothers, Wisconsin .... March, 1915
V. Priessnitz, Wisconsin......March, 1915
F. J. Ties, Wisconsin.........March, 1915
J. Marshall, Indiana..........March, 1915
H. D. King, New Jersey......March, 1915
W. E. Bedford, North West Territory .... March, 1915
G. H. Longley, Massachusetts..Feb., 1915
H. N. Seeley, New York......Feb., 1915
J. A. McGaughey, Washington..Feb., 1915
A. E. Roesner, West Australia..Jan., 1915
Alf. Seidel, Nebraska.......... Jan., 1915
Brown & Peterson, North Dakota.Jan., 1915
H. F. Schreiber, Pennsylvania...Jan.; 1915
A. C. Elder, Georgia...........Jan., 1915
C. W. Enyeart, Indiana.......Jan., 1915

Suggestions for the Construction of Concrete Floors for Smith Shops

Elton D. Walker
Professor of Hydraulics and Sanitary Engineering, Pennsylvania State College

Materials

The materials needed for making concrete are cement, sand and crushed stone or gravel.

The cement should be a first-class Portland cement, which should meet the minimum requirements for Portland cement of the American Society for Testing Materials. In the case of small jobs, where the expense of testing would not be warranted, it is generally sufficient to select any of the best-known brands of Portland cement, provided the cement is purchased in the original packages and does not show any signs of caking.

The sand should be free from organic matter, loam, etc., though it may contain a small amount of clay, not over five per cent by weight, provided the clay does not occur in lumps or as a coating on the grains of sand. If the clay is in lumps it is apt to causing pitting on the surface of the concrete when the clay is washed away after the floor has become hard. The sand should be well graded from coarse to fine with coarse grains predominating. All of the sand should pass through a quarter-inch screen.

Screenings from crushed stone or gravel which comply with the requirements for sand may be substituted for part or all of the sand if desired.

The crushed stone should consist of pieces of hard rock, trap, granite, limestone, conglomerate or slag, screened dry through a ¾-inch screen and retained on a ¼-inch screen.

Gravel should be composed of clean, hard pebbles, varying in size from ¼ inch to ¾ inch. It should contain no vegetable matter or loam and should have no clay in lumps or adhering to the pebbles unless it can be easily brushed off.

The water used for mixing the concrete should be reasonably clean and free from oil, acids or strong alkalies.

Forms

The forms should be of scantling, free from warp and not less than 1¾ inches thick. Any dirt, old mortar, etc., should be removed before placing them in position. After being properly cleaned, the forms should be firmly staked in position with their upper edges conforming to the finished grade of the floor. In the case of barn floors or others liable to be wet the surface should have sufficient slope to insure drainage, but this should not exceed ¼ inch per foot.

In order to avoid cracking the floor should be divided into blocks. One of the easiest methods of accomplishing this satisfactorily is to stake down pieces of scantling with the distance between them equal to one side of the square block and to stake cross pieces down between them, leaving alternate spaces equal to the size of the blocks to be formed. Fig. 1 shows such an arrangement for blocks 5 feet square.

The blocks "A" are first formed and after the blocks have hardened

the cross pieces are removed and the blocks "B" are constructed, the longitudinal strips being left in for twenty-four hours more. If the floor is not less than three rows wide this arrangement can be carried out in two rows at a time, and after the longitudinal strips have been removed the remaining rows can be laid in the same way, the edges of the blocks already formed taking the place of the longitudinal strips. The letters in the figure are intended to suggest the order in which the blocks should be formed.

Sometimes the cross pieces are dispensed with and spacers of wood or iron about half an inch thick and wide enough to extend through the base of the concrete are used instead. In this case after the longitudinal strips are staked down and the spacers put in position a length of concrete equal to several blocks is laid and rammed. The spacers are then removed and the place which they have occupied is filled with sand to prevent the joining of adjacent blocks. After the top coat is laid it is cut through into the sand by means of a trowel guided by a straight edge held across the concrete. The straight edge is placed in position by means of marks on the scantling so as to come directly over the sand joints.

Another method is to use no division strips at all, but to place the concrete base continuously and, after ramming, cut it through with a cleaver along the lines dividing the blocks, filling the cuts with sand as above.

Size and Thickness of Blocks

The blocks should in no case be less than 3 inches thick and seldom need be more than 4 inches thick for ordinary floors. For heavy service it may be necessary to make floors as thick as 6 inches.

For floors in places where ranges of temperature are not very great and where there is little or no danger from frost the blocks may be made 6 or 8 feet square, but the difficulty of forming true surfaces increases with the size of the blocks.

Foundation

The foundation should be prepared by leveling off and thoroughly compacting the earth by ramming. Any soft spots should be removed and replaced by hard material. If any filling is required to bring the earth to the desired grade the material deposited should be well rammed in layers not over 6 inches thick, and the earth be slightly moist during ramming, one rule being that if a small quantity be squeezed in the hand it should retain its shape when the hand is opened, but not be so wet as to be sticky.

If the soil is compact and there is liable to be trouble with ground

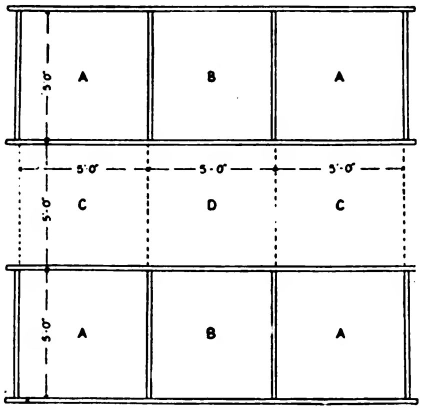


FIG. 1—TO AVOID CRACKING THE FLOOR IS DIVIDED INTO BLOCKS

water, or in the case of floors subject to the action of frost, adequate provision must be made for drainage and the natural soil covered with a layer of broken stone, gravel, cinders or coarse sand about 6 inches thick. The stone, gravel or cinders should be screened to remove fine material in order to facilitate drainage. This layer should be well rammed and if cinders or sand are employed should be thoroughly wet while being rammed.

Concrete Base

For ordinary floors proportions often used are one part cement, three parts sand and six parts stone or gravel. For floors subject to rough usage, teaming, etc., a richer mixture is necessary, such as 1:2½:5, or the ingredients may be proportioned with reference to the voids. In any case the cement should be measured in barrels as packed, or if the cement is shipped in sacks one sack, weighing ninety-five pounds, may be taken as one cubic foot. The writer is aware that this weight is a little under that ordinarily assigned to one cubic foot of cement, but if the voids are over-filled, as later suggested, this error is fully compensated for and the convenience of measuring the cement in this manner has much to recommend it. One barrel of Portland cement generally holds about $3\frac{8}{10}$ cubic feet. The other ingredients may be measured in the same barrels in which the cement is received, both heads being knocked out, or in specially constructed bottomless boxes as shown in Fig. 2. The measuring box for sand should be about 6 or 8 inches deep and with the other dimensions so as to contain sufficient sand for one batch of concrete. The measuring box for stone would be somewhat deeper and also contain enough for one batch. In measuring the sand or stone the bottomless box or barrel is placed on the mixing board and filled flush with the top. It is then lifted, leaving the material on the board. If barrels are used the materials must of course be spread, as described later.

If the ingredients are proportioned with reference to the voids sufficient sand should be used to fill the voids in the stone or gravel and sufficient cement to overfill the voids in the sand by about ten per cent of the volume of the voids.

To determine the voids in the sand fill a vessel with sand and weigh. Let the net weight of the sand be S. Then fill the same vessel with water and again weigh. Let the net weight of the water be W. Then the percentage of voids—

$$\frac{2.65\ W—S}{2.65\ W} \times 100.$$

To find the voids in the stone or gravel fill the vessel with this material and weigh. Then slowly add water to the vessel filled with stone, pouring the water in near one side so as to allow the air to escape from between the stone until it stands level with the surface and again weigh. Let W be the net weight of the added water. Fill the same vessel with water and let the net weight of the water be W. Then the percentage of voids—

$$\frac{W}{W} \times 100$$

In making these determinations use a vessel containing not less than half of a cubic foot; the larger the vessel the more accurate the results.

In mixing the ingredients the sand should be spread on a tight platform which for convenience should be not less than 8 feet square. The cement is then spread on the sand and the two turned with shovels a sufficient number of times to produce a uniform color throughout. This may then be mixed with the stone before adding the water, or may be

made into mortar before mixing with the stone. If the latter the stone should be thoroughly drenched with water before being added to the mortar. The mixture is then turned a sufficient number of times to produce a concrete of uniform appearance, with the stone thoroughly coated with mortar and of uniform consistency throughout. Ordinarily this requires not less than three complete

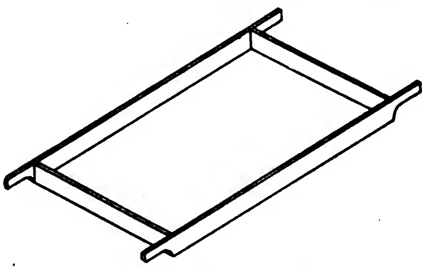


FIG. 2—BOTTOMLESS BOXES MAY BE USED FOR MEASURING MATERIALS

turnings of the mass. Sufficient water should be used to produce a concrete in which the mortar shall flush to the surface when the concrete is thoroughly rammed. If it is necessary to add more water during the mixture in order to produce the desired consistency the whole mass should be turned at least once after the addition of the water.

The concrete should be deposited as soon as possible after the mixing board to the forms in water-tight wheelbarrows. The concrete should be spread evenly in the forms and thoroughly rammed until the mortar rises to the top. The surface of the concrete after ramming should be sufficiently below the top of the forms to give room for the wearing surface.

Workmen should not be permitted to walk on freshly laid concrete, and if any sand or dirt collects on the surface it should be removed before the top coat is applied.

Wearing Surface

The wearing surface should have a thickness of at least ¾ of an inch and should be composed of one part cement to two parts sand or screenings. The cement and sand should not be mixed long before using, as the moisture in the sand would cause the cement to cake. The ingredients are mixed dry and turned until of a uniform color throughout. Sufficient water is then added to produce a mortar that will not require tamping, but can easily be leveled off with a straight edge.

The mortar for the wearing surface must be deposited on the concrete of the base before the latter has begun to set. The surface is smoothed off by a straight edge resting on top of the forms and is then roughly floated. After the cement has begun to set the surface is finished by troweling. Too long troweling will produce a glassy surface, covered with minute hair cracks which should be avoided.

If the top coat has been laid in a continuous sheet it must be cut through, as previously described, and in any case the edges of the block should be rounded off to a radius of not less than ¼ inch. Special edging tools are available for this purpose.

It may also be necessary to form grooves in the surface about 6 inches apart each way, in order to give a better foothold for horses.

Protection

After the floor is completed it should be kept moist and protected from the weather. If exposed to direct sunlight it should be covered with moist sand, or with canvas supported a short distance above the surface for at least three days, and should not be subjected to rough usage for a longer period. No concrete should be laid during freezing weather.

Tools

The following tools are necessary or desirable:

A mortar box for mixing the materials for the wearing surface.

A tight platform about 10 or 12 feet square for mixing concrete.

A measuring box for sand and one for stone. In place of these, barrels with both heads removed can be used, as previously stated.

One or two wheelbarrows, preferably of iron.

Square-pointed shovels.

Hoe.

Materials for forms, including stakes for fastening.

Steel square.

Spirit level.

Straight edge of wood long enough to extend across the blocks.

One or two rammers with faces 5 or 6 inches square.

Mason's trowel.

Pointing trowel.

Plasterer's steel trowel.

Groover.

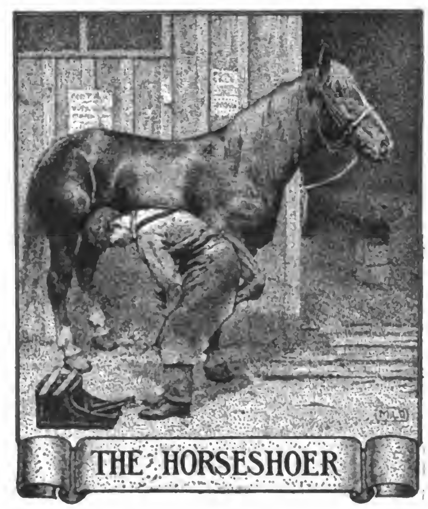
Edging trowel.

Amount of Materials

To lay 100 square feet of floor with a 3-inch base made of 1:3:6 (see page 28) concrete would require 1.13 barrels of cement, 0.48 cubic yards of sand and 0.96 cubic yards stone. For 1:2½:5 concrete 1.38 barrels cement, 0.47 cubic yards sand and 0.94 cubic yards of stone would be required. A wearing coat 1 inch thick covering the same area with a 1:2 mixture would require 1.13 barrels of cement and 0.32 cubic yards of sand. For other thicknesses or proportions the amounts can of course be varied accordingly.

Sidewalks

Concrete sidewalks may be laid in accordance with the above instructions for floors, with the additional note that in case of fills the fill should extend about 1 foot each side of the walk at the level of the walk, and except in case of open, sandy or gravelly soils a foundation of cinders or other materials, as described above, should always be used to provide adequate drainage and avoid trouble from frost. The surface of the walk should have a slope of ¼ inch per foot toward the outer edge.



Shoeing in Record Time

From Texas Newspaper

"I give you a brief sketch of my horseshoeing experience. I have been a horseshoer for nineteen years and claim to be an expert at the business. I know exactly what a horse's foot consists of. I claim to have no equal as to speed in shoeing. The record at Washington is my witness. The papers I send are numbered 290,392, United States Quartermaster's Department, and are as follows:

"The State of Texas, County of Coleman.—Before the undersigned authority on this day personally appeared S. H. Brown, Homer Burden and W. B. Woodward, all of whom are

well known to me and are creditable citizens of Coleman County, Texas, and after being duly sworn by me on oath state that on October 8., 1910, they were present and saw L. E. Layne, of Santa Anna, Texas, shoes a horse all around with new shoed and with several nails to the shoe, and that they timed the said Layne and that the time consumed in putting on the four shoes and completing the job was five minutes and twelve seconds—Homer Burden, S. H. Brown, W. L. M. Mills, W. B. Woodward, Mayor.

"Sworn to and subscribed before me this 11th day of February, 1911.—J. T. Overby, Notary Public, Coleman County, Texas."

C. L. Mills, owner of the horse that was shod, also makes affidavit that the shoes are still on the horse and in good condition, nearly four months after the job was done."

L. E. LAYNE.

How One Smith Solves the Apprentice Problem

W. W. Morrison

I have been a constant reader of "Our Journal" for three years and am very much pleased with it. I find it one of the handiest tools in my shop. It is amusing to read of the different ideas and the different ways in which they are expressed. It is also very amusing to read of the set notions of some of the old "cronies" in the trade. They think that a young man now in the trade must keep his nose to the anvil about fourteen hours a day in order to do "a day's work" as they call it. They don't seem to realize that with the modern tools one man can accomplish more in ten hours than two men could in the same time twenty-five or fifty years ago.

I have been here three years. I own my business and there is not one dollar against it. I have built up a good trade and have all the work I can do. I have an apprentice; he will be with me two years next March. He is doing fine and will be a good mechanic.

I have one of the old "cronies," as I call them who comes to the shop nearly every day. He is too old to work at the trade and is one of those old fellows who are set against all machinery and who thinks a job isn't worth sending out of the shop unless it is done entirely by hand. He worked all his life in the shop I now own and I suppose that is why he comes so often—it seems to be a part of him. He will sit for hours and watch me work. His son is my apprentice and it is comical to see the expression on the old man's face as he watches his son doing the same work which he did but in a different way. I often tell the son: "Listen to all your father tells you; take his ideas and work them out, take my ideas and work them out and take your own ideas and work them out—then take those you think are best and stick to them until some one shows you better ones."

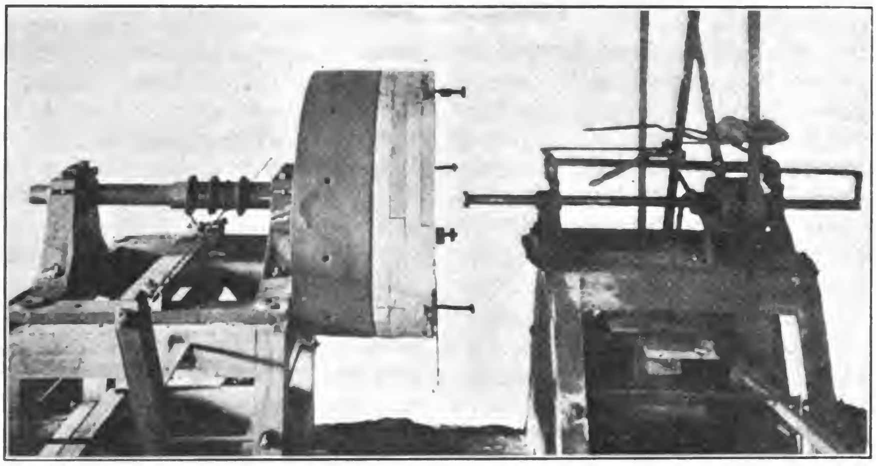
When I bought this shop it was a Tom Tardy, pure and simple. I have now two Royal Western Chief blowers, two nice anvils, a Green River tire upsetter and bender, a Wiley & Russell shoeing vise, a vise press drill, a fine set of taps and dies with a stock to each die, a foot-power turning lathe and all the smaller tools for ordinary use. So, you see, I have done pretty well in three years, and if I have good luck and health intend to have a five-horsepower engine and band-saw next year.

I have read a great deal in "Our Journal" about the apprentice question and about the craft going to the dogs. Well, my opinion is this: If the craft is going to the dogs, it's the smiths who are feeding the dogs. You often read of smiths saying they can't get any boys interested in the trade. They will stay two or three months and then give it up. What is the trouble? Brother Blacksmith, it is simply this. You want him to work a year for two or three dollars a week; you keep him at pulling off shoes and finishing up horses feet until he is sick of the shop and everything in it. I don't pretend to know it all but I think I know how to handle an apprentice. Give him a chance—a fair chance. I was an apprentice once and so were you. You know how you felt—I know how I felt, and no doubt we felt pretty much the same, as I think most apprentices do. If the apprentice expresses his opinion of a job, work it out—it may be better than yours. Don't pretend to know it all; if you work it out it will please him. Pay him what he is worth to you. Give him an increase in wages just as soon as he is worth it. Don't wait until he asks for it. I will never forget the time I saw a smith trying to teach an apprentice to calk a shoe. The boy took hold

A GENERAL SMITH SHOP OF NEW ZEALAND

of the hammer and the smith took hold of the boy's hand and tried to show the boy how to turn a shoe. The smith got angry because the boy could not strike a square blow and what was the result? Why, the boy became completely discouraged.

Let me ask some of you old-timers: What kind of a blow could you strike with someone holding your hand and attempting to strike just opposite the direction in which you were attempting to strike? You can answer without stopping to think. Then think of the poor little apprentice who is all nerved up and sympathize with him. I have seen smiths give an apprentice a "call down" for burning a piece of iron in two. There are lots of botch blacksmiths in the country and nine-tenths of them are the result of not giving the apprentice a fair chance, and "calling him down" for every little mistake he



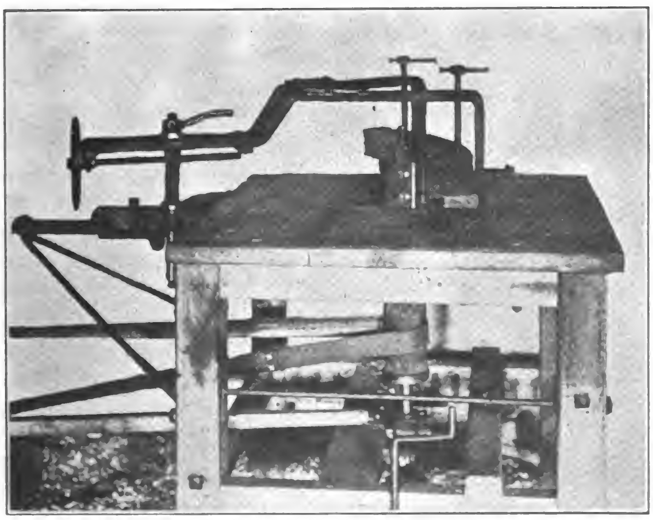
MR. CHISHOLM'S HUB-BORING MACHINE IS OF HOME MANUFACTURE

makes and never giving him a word of praise. Finally, he is afraid to tackle anything, gets in the old rut and stays there, developing finally into what I call a "mis-mechanic," or, in other words, a "botch."

My apprentice agreed to serve four years with me. He agreed to work one year for a certain sum per week. In six months I doubled his pay. In the summer he has Saturday afternoons off with full pay. I give him a chance and he is making good. He is interested in the craft and reads every copy of "Our Journal." I keep them right at hand in the shop on a shelf by themselves.

There is one more little subject I want to speak about. Some old smiths think a modern smith should have no pleasures. They often speak against baseball. Well, I want to tell them right now that baseball is one of the manliest games ever invented. I have been manager of the local ball team for two years. My apprentice is catcher on the team. We play every Saturday afternoon. Beginning May 1st and until November 1st I close my shop at noon on Saturdays. I post a sign in the shop every spring two months in advance, and keep it posted all summer. I have not had one single customer kick against it. They all say that a man who works so hard as I do ought to have one afternoon in the week to himself. I simply make it a rule and keep it. Everybody knows of it and there is no trouble. It does not interfere with my work. I open my shop at six in the morning and every morning. My apprentice goes to work at seven. We close at six every day except Saturday, when we play a game of baseball in the afternoon. There is a lake near the shop and after the game we take a swim. We go to church regularly on Sundays and both of us sing in the choir. We go to work Monday morning feeling fine and between then and Saturday noon we turn out as good a week's work as any of them. We get lots of automobile work, which is profitable. Get after it, brothers, there is money in it.

Remember the apprentice, brothers. He is the one who, after we are gone, has to carry along the road of progress one of the best trades in the world. And when we are too old to work at the trade we can look at some healthy youth who is making the old anvil play the tune that is sweet to our ears, and who is also a good mechanic. Then we can point our fingers and tell our old comrades, "There is a man who learned his trade with me; he is a good mechanic because I gave him a fair chance."



THIS WOOD SHAPER IS ALSO A HOME PRODUCTION

A General Shop of New Zealand and Two Shop-Made Machines.

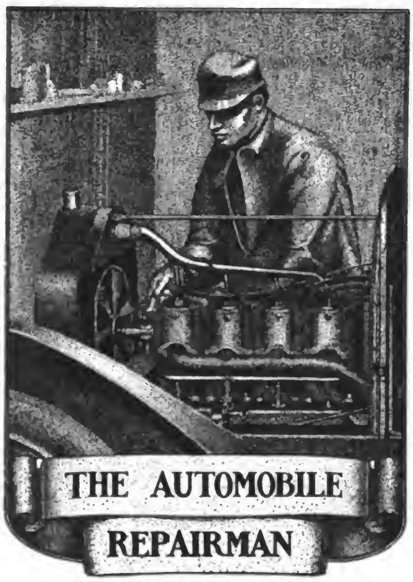
HUGH CHISHOLM

The engravings show a picture of our shop and two machines which we ourselves made. In the shop picture the smithy is shown to the left in the background. The smithy is 43 by 33 feet, with two forges, bellows overhead which gives more floor space, tire shrinker and tire bender. The wood shop is 30 by 24 feet, two stories high. It contains spoke-tennoning and wheel-building trestle combined (our own make from old McCormack binder), Boynton & Plummer drill press and a hub-boring machine (also our own make). This machine is for boring hubs. To take bushes wheel is bolted to face plate and trued up. The spindle, which is seen in front, is provided with a cutter and can be moved to and from the work by the levers seen above. To bore a taper hole the frame which carries the spindle is brought over or towards you and the necessary distance required for the taper is obtained by loosening bolt at right hand side and bringing the frame over. The frame which carries the face plate can also be moved back and forth, which movement gives you the size of hole wanted. You will notice this machine is made from odd pieces of binders, etc. The mortising and boring machine, which we use, is also made from old binder. We have a wood-turning lathe upstairs and a metal-turning lathe below. The vertical spindle planer, shown in the engraving, for dressing insides of felloes, is clearly enough shown in the picture not to need further explanation.

I must not forget to introduce you to the "gentleman" who is responsible for the operation of these machines—who is ready and willing to do his duty whenever called upon. I generally notice he is kept out of the way as far as possible by all parties. He is christened "The Demon" and was made by the Pasley Company, of England; he develops $4\frac{1}{2}$ horsepower.

Our tireing plate you will see just to the right of the center of the shop picture. It is of concrete and has been in use now for over twenty years. It is still in use and as good as ever. It cost but 30s. ($7.30)

Any of our readers wishing to make any of the above machines I will be happy to give them all particulars. We have been in business here for thirty-two years. We like The American Blacksmith; the young lads read it from beginning to end. I enclose the remittance for five years' subscription.



Adjusting, Repairing and Caring for the Automobile–6

With Special Reference to the Packard Car

Running Gear Features

There is an external contracting brake and an internal expanding brake on each rear wheel. The external brakes are operated by the right pedal. The internal brakes are operated by the hand brake lever. The foot brakes are the regular service brakes for all ordinary purposes. The hand brakes are for emergencies and for use when it is desired to set the brakes with the car standing. Each external brake consists of an upper and a lower brake band. These are contracted upon the brake drum when the pedal is pressed forward. These brake bands are lined with a special friction material which gives the maximum degree of service without burning. Each internal brake consists of two metal brake shoes, or segments. One end of each of these shoes is hinged and between the free ends is a cam which is operated by the hand lever. When the hand lever is pulled backward the cam is turned and the brake shoes are separated to bear upon the inner periphery of the brake drum. Both sets of brakes operate as well when the car is moving backward as when it is moving forward.

Apply the brakes gradually. This is not only easier on the brakes but applies the minimum strain to the car and saves the tires. When stopping the car or slowing it for rounding corners, reduce the speed as much as possible by closing the throttle and then apply the brakes. Do not unnecessarily apply the brakes harshly upon a swiftly moving car. If the brakes are in good condition and properly adjusted, either the foot or the hand brakes are sufficient to slide the wheels. When descending very steep hills, assist the brakes by shifting the gears into second speed, engaging the clutch, closing the throttle and allowing the motor to run with the spark slightly advanced.

It is important that the brakes be evenly adjusted, so that when either set is applied, there is the same resistance on each rear wheel. The equality of adjustment may be determined by noting whether or not the wheels begin to slide at the same time when each set of brakes is forcibly applied. Another test is to jack up the rear axle, rotate each wheel and note if the resistance of the brakes is equal.

Adjust the foot brakes as follows: Between the brake band actuating lever and the upper brake band is an adjusting screw, which allows the distance between the free ends of the brake bands to be regulated, and consequently the setting of the bands so that their action is correct. It is not desirable to adjust the brakes by means of the connecting rods or brake pedal connections, except to get the proper action of the pedal after the brakes themselves have been adjusted as above described.

The hand brakes should be adjusted for wear by the adjusting means provided in the actuating lever and cam mechanism of each brake. In adjusting the internal expanding brakes, be careful that the lever which operates each expanding cam does not slant so far to the rear that it partially applies the brake when the hand lever is released. Keep all brakes as tight as it is possible for them to be without dragging. When the rear axle is jacked up, the rear wheels should turn easily if the brakes are not applied.

The steering gear is of the worm and sector type. Adjustments are required only at extremely long intervals. The exterior steering connections should be frequently inspected, kept in good condition and properly lubricated.

Shock absorbers supplement both the front and rear springs of the car, these being attached between the axles and the frame by rigid, permanent brackets. Before being applied, the shock absorbers aread justed to provide the correct frictional resistance when the indicator is at zero on the adjusting dial. The nut is then turned to the right to whatever number indicates the proper final adjustment for each of the different Packard cars, according to the following table:

Car	Front	Rear
"Thirty" Touring Car	3	4
"Thirty" Close-Coupled	3	3
"Thirty" Phaeton	3	3
"Thirty" Runabout	2	3
"Thirty" Limousine	3	5
"Thirty" Landaulet	3	5
"Eighteen" Open Car	3	3
"Eighteen" Runabout	2	3
"Eighteen" Limousine	3	4
"Eighteen" Landaulet	3	4

If extreme wear necessitates replacement of the friction washers, the shock absorbers must be set to give the normal resistance at zero before finally adjusted to the above normal degrees.

Keep the spring clips tight. The object of the spring clips is not only to hold the springs firmly to the axles, but also to prevent movement of the spring leaves between the clips. Preventing this movement minimizes the chance of breakage. The breakage of springs at the middle is almost entirely caused by loose spring clips. When a car is new the spring clips should be examined and tightened every day until the stretch of the metal has been taken up. After this, the clips need not be examined oftener than once a week.

Cold Weather Procedure

Before stopping the motor, after any run, almost close the throttle to

reduce the speed of the motor and then turn the auxiliary air valve adjusting lever, on the dash, clear over to "Gas." This produces a mixture which is too rich to ignite when the motor is warm and causes the motor to stop, after which the ignition switch should be turned off.

The above stopping procedure fills the cylinders with a rich charge and, in many instances, the motor, after having been left in this condition, may be started by opening the throttle one-third way, turning the switch to "Battery," and retarding the spark. The extremely rich charge is needed for starting in cold weather because the cold motor renders it impossible to obtain an easily ignitable mixture by normal procedure.

Should the motor fail to start by the above procedure, employ the following cold weather starting method: Turn the auxiliary air valve adjusting lever, on the dash, to "Gas." Place the throttle hand lever about one-third the way open. Crank with the ignition switch turned off. Advance the spark lever halfway. Turn the ignition switch to "Battery." Retard the spark lever, but immediately advance it when the motor starts.

A button below the radiator, at the right side, controls a shutter in the primary air intake of the carburetor. Before starting in cold weather, pull this button forward and thus close the air intake. Mixture drawn from the carubretor will be rich and hence assist starting. After the motor is started push back the button to open the air intake.

If the motor is too cold to start by the above methods, inject a small quantity of gasoline into each of the cylinders, through the priming cocks. This provides an initial charge for starting the motor, after which there should be no difficulty.

After the motor has been running for a few minutes, turn the auxiliary air valve adjusting lever, on the dash, gradually toward "Air." Even after the motor is started a richer mixture is required while it is still cold than after it has become warm by running.

Do not flood or prime the carburetor. Do not start with the throttle wide open. Do not crank the motor with the auxiliary air valve adjusting lever turned to "Air." Do not allow the motor to run with the spark retarded.

If the car is not to be sued during freezing weather, the water circulation system should be thoroughly drained. During freezing weather, fill the water circulating system with one of the following anti-freezing solutions:

For a temperature not lower than five degrees below zero:

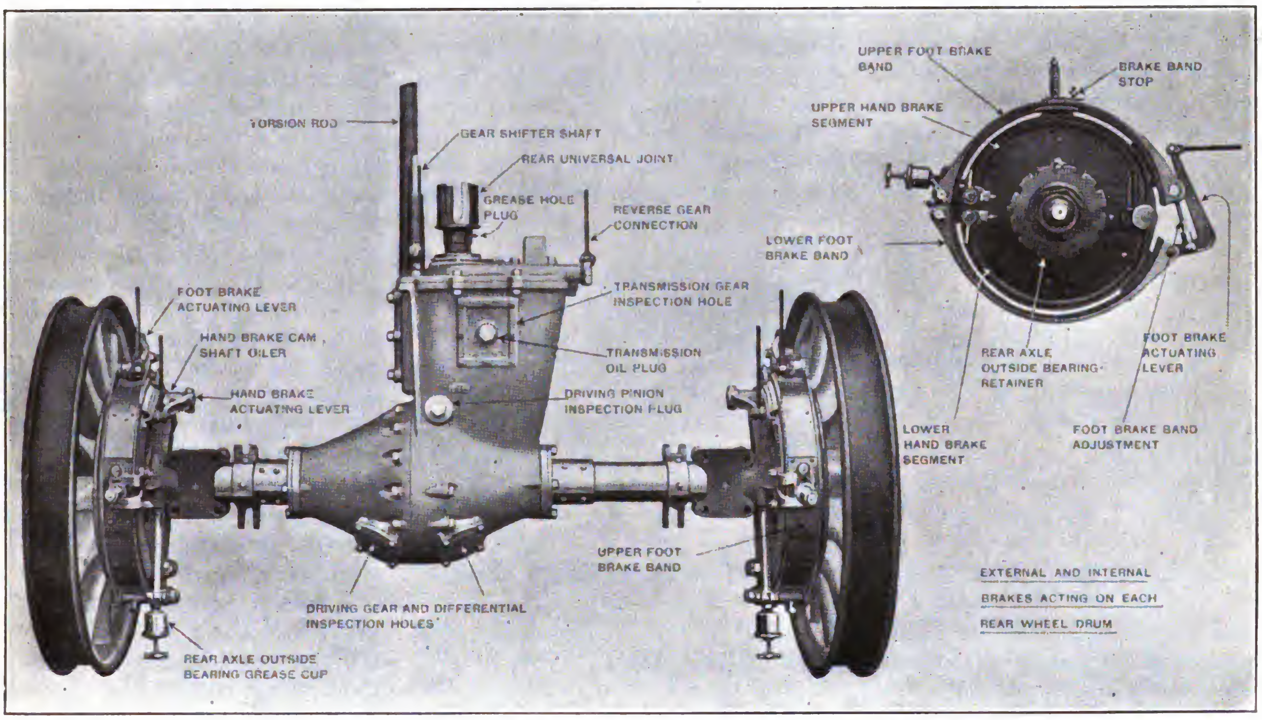
Wood Alcohol	15 per cent.
Glycerine	15 per cent.
Water	70 per cent.

For a temperature not lower than fifteen degrees below zero:

Wood alcohol	17 per cent.
Glycerine	17 per cent.
Water	66 per cent.

About five gallons of solution are required for a Packard "Thirty" car, and about 4½ gallons for a Packard "Eighteen." Alcohol should be added occasionally to make up for evaporation. The glycerine does not evaporate with the water. The above solution has been found to be entirely practical and is the best for several reasons. A simple solution of alcohol, while it is not injurious in any way, lowers the boiling point of the water. Consequently, on warm days, with the car standing and the motor running, the solution will tend to boil easily and evaporate. The use of glycerine raises the boiling point of the solution. It is more expensive than alcohol and is slightly injurious to rubber. All things considered, however, a combination solution of alcohol and glycerine in water is the most satisfactory. Do not use a solution of calcium chloride or any alkaline solution, these being injurious to the metal parts.

As recommended use cylinder oil instead of the heavier transmission oil, in the transmission gear case and



THE REAR AXLE WITH ITS BRAKES. A WHEEL DRUM WITH ITS EXTERNAL AND INTERNAL BRAKES IS ALSO SHOWN IN DETAIL

the differential housing, during cold weather. While all of the working points of the commutator should be well oiled, the commutator box should not contain a surplus of oil in cold weather, as the congealing of an over-supply may prevent proper contact between the roller and the segments.

Several Automobile Repair Hints

J. N. Bagley

Every now and then a car comes to the garage for repair with a number of teeth broken from the pump or timing gears. Of course, if we can get new gears we will at once proceed to replace the broken ones. Many times, however, some tourist drops in who must be fixed up on short notice and in this case the gears must be repaired. Gears made of fiber which are used in some makes of old cars may be repaired by screwing a pin or two in place of the broken tooth, as shown at C. Any mechanic can do this job without difficulty. In case the gears are metal the job will be a little more difficult, but after the repair is made it will answer very well and will give good service.

The first thing necessary in case the gears are metal will be to make a dovetail for the new tooth, as shown at D. This should be as deep as the flange of the wheel will allow without having a tendency to weaken it. Next in order will be a rough tooth fitted as shown at A. After placing the rough tooth it should be brazed in. One should not attempt to braze brass unless experienced, as it will fuse at almost the same temperature as the spelter. After the tooth has been brazed it should be finished to correspond with the remaining teeth in the wheel, see B in the engraving.

To braze the broken tooth to the body of the wheel will not be found so difficult as many imagine. The operation is simple if done in this manner: Get a good, clean fire of well-burned coal and place the wheel so the melted spelter will flow to the joint made in placing the tooth. Heat very slowly until a good, even heat has come to the part to be brazed and apply a little good, fresh, clean borax. Let this melt and run like water. Now place the spelter and again cover with borax. If the heat is high enough the spelter will flow like a liquid over the parts where placed. Care should be taken not to get the parts to be brazed hot enough to burn, for one may increase the heat a little if the spelter will not flow, but it would be hard to repair a wheel that was half burned up. Let the job cool of its own accord, after which it may be cleaned and dressed and the job is complete and the wheel may be placed.

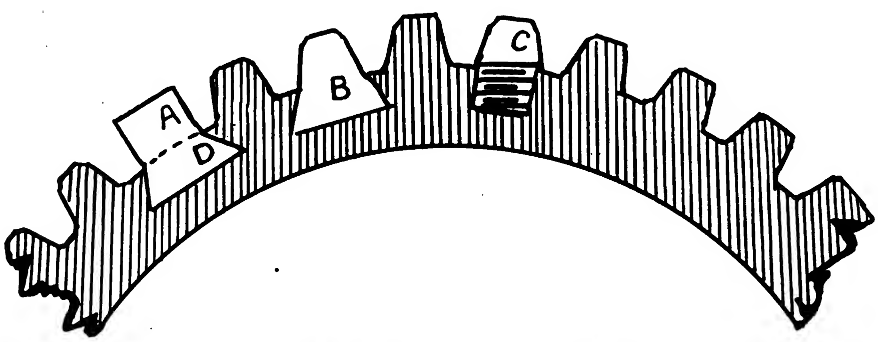


FIG. 1—GEAR WHEELS SOMETIMES LOSE ONE OR MORE OF THEIR TEETH

The Care of Valves

One of the parts about the gas engine which the repair-man has to deal with a great deal is the exhaust and intake valves. The valves become worn and must be refitted to their seats, or "reground." If the valve is not in a very bad condition it may be ground down to a perfect fit with emery dust, but in case the valve seat has a ridge around it we must resort to something better. Fig. 2 shows a very good way of getting the seat of the valve in first-class condition. Place the valve between the centers of the lathe, as shown in the engraving, and place the lathe dog C at the stem end. Make a tool which will fit the tool post of the lathe, having a shape similar to that shown at D. Grind the edge down very thin and finish with a fine oil stone. Feed the tool up to the valve seat very light, cutting just enough of the metal away to leave the seat in a perfect position. Of course, after getting the valve perfect it will not fit the seat in the cage, but this may be trued up with this same valve by cementing a small piece of emery cloth to the valve, leaving the cutting side out. Place the valve into the cage and turn it in the same manner as to grind the valves. The emery cloth will be forced to cut the seat in the cage to correspond with the seat of the valve and after removing the cloth there will be found a very good joint. Of course, the same operation of grinding with the emery flour must be gone through to get the smooth, bright surface that is necessary to insure a perfect fitting valve. After this operation has been gone through with it will be found that the valve stem may, if not worn off, be too long and when placed into the cage will come against the valve push rod and not allow the valve to seat. In this case it will be necessary to remove enough of the stem to allow a thin card to pass between the stem and the lift. This applies to the old motors, as most of the new motors have a take-up which allows for the wear of the valve stems. A very good plan to test the valve after grinding is to place a quantity of gasoline on it and notice if it leaks through. A valve that will hold gasoline or kerosene will hold compression. When replacing the valves the springs should be examined; if weak they should be stretched or replaced with new ones. If a spring is broken and a new one can not be had, a small washer may be placed between the two parts where broken to keep them from working together.

Among some of the things that give a great deal of trouble is the little rods which lead to the carbureter valve and the sparking device. These are so small it is not profitable to repair the ends, and new ones may be made much quicker. The most particular thing about them is their length. Of course, a neat turn at the ends will make the job look better and they can be made in a second with a device, as shown in Fig. 3. Take a block of steel and drill two or three holes in it to fit the different size rods that are used for this purpose, and place in the vise as shown at B. Heat the rods at the end to be bent and place in the hole in the block and bend with the hammer as shown at H, striking a light blow.

The turn will be a right angle and not a curve, as it would be in case it was bent over the corner of the anvil. In case the holes in the levers or bell cranks are a little worn they may drilled out to receive the next larger size rod. After making the bends at the ends a small hole should be drilled for the key to keep them in place in the cranks. In case the small cranks are steel, it is well to case harden the ends that are subject to wear, as already explained in case hardening the pins for the steering device. In case these little rods are too short after being bent, they may be drawn out a little by heating and hammering in the center, but in case they are too long the job will be a little more difficult, for in bending them one will spoil the looks of the job, and if the rods are very small it will be a difficult matter to swage them together. In case one has no pattern and it is rather a tedious job to get the correct length of the rod, a small, turnbuckle placed on the rod will allow the length to be changed to suit the case.

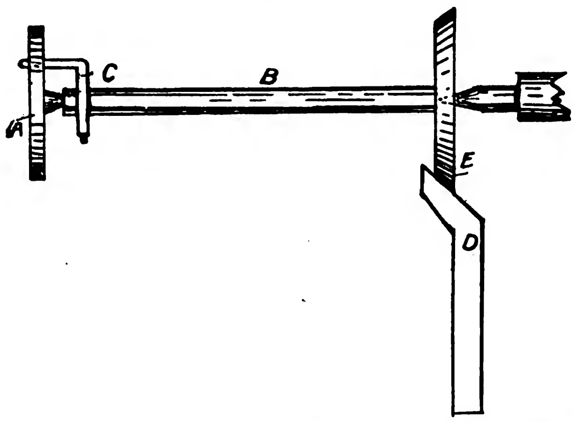


FIG. 2—VALVES MUST BE IN PERFECT CONDITION

Repainting and Revarnishing Carriages and Automobiles

W. A. Riggleman

After your paint shop is in good condition, get a good painter and give him good wages for the time he works. Even a good workman cannot do good work with poor stock and poor tools, so get in a good stock of varnishes, colors, good keg white lead and some brushes. After the shop has been well stocked, you might try the following excellent method of repainting and revarnishing carriages, buggies or automobiles.

After your jobs are taken apart, numbered and in the paint shop, washed and grease cleaned, start working on the body of the vehicle. Do not burn off the old paint, unless you get a good price. They do not want to pay much these days, so simply sandpaper the body thoroughly. After sandpapering give the body a coat of lead, mixing keg white lead with dry rough stuff to color, a little Japan and a very little raw linseed oil. When this coat is dry, putty or glaze, all over if need be. When the putty is dry, sandpaper it. Apply a coat of ordinary rough stuff (ready mixed, for it is the best) and when dry apply four coats. Rub body out, and let stand to dry. Sand paper lightly inside and out, and, if getting a fair price for your job, give body a coat of lamp black, ready mixed in Japan. When dry, give body a coat of strong black varnish. If you are not getting a good price, cut out the lamp black, and simply give body a coat of strong or solid covering color varnish. In applying the coat of solid covering, use keystone black rough stuff, as you will then be saving both time and stock, and the body will be well covered. After the black rubbing varnish is dry, rub and finish with a good hard drying body varnish.

For the old gear or chassis, clean gears thoroughly, sandpaper well, and give both gear and chassis a coat of lead, using mixture the same as was used for body, and applying with a bristle brush. When dry, putty, and when putty in turn is dry, sandpaper. The filler or rough stuff in the lead makes sandpapering an easy matter, and also makes an excellent foundation for the colors and varnishes. After sandpapering, give gears or chassis a coat of color (whichever color you desire them to be). When this coat is dry, apply a coat of color varnish, ready mixed. If you do not get a good price, cut out the color (and also, of course, the time necessary for putting it on), and use the solid covering color varnish. This solid covering color varnish can be had from some varnish firms, but be sure to get the best, that which is made from good color and good rubbing varnish. Try samples until you find a good one. After the color varnish is dry on the gear or chassis, moss, stripe and finish. Get a good heavy hard-drying gear varnish. If you have had bad luck with your varnishes heretofore, give some other varnish a trial—do not buy a big stock, until you know that the stock is good.

I have heard painters say that all that was needed was a good foundation on the body such as lead and rough stuff. How long would buggies, carriages or automobiles last if they were turned out with nothing but lead and rough stuff for a foundation! The water and weather would soon settle them. If you mixed your leads and rough stuff with strait oil, the vehicles would soon go to pieces. Varnish is what you need on top of your lead and rough stuff, and plenty of it. Varnish keeps the water and weather from affecting the grain of the wood. The bottom of the vehicles should be coated as thoroughly as any other part of the job. Does not the water work into the bottom, get under the sills and rot the bottom of side

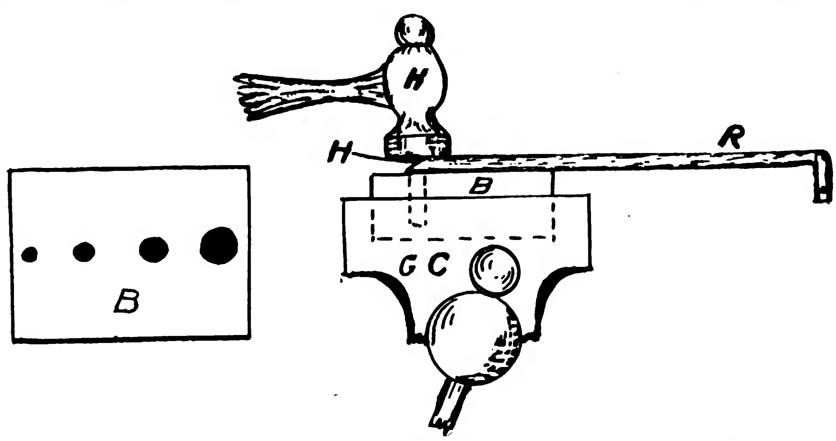
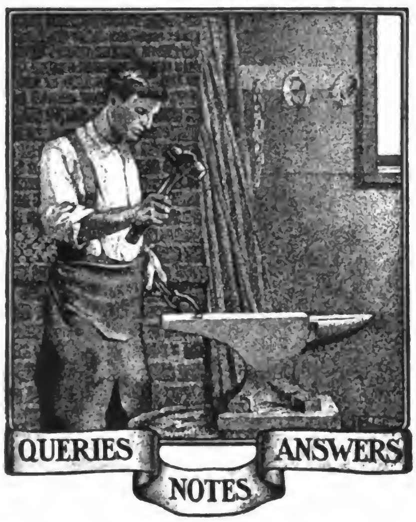


FIG. 3—A STEEL BLOCK WITH SEVERAL DRILLED HOLES SIMPLIFIES THE BENDING OF THESE RODS

panels? Most painters give just one coat of slush black varnish—how long will that stand? Some time ago we used to lead the bottoms and putty all the nail holes. Bottoms should have one good coat of lead and two or three coats of filler or rough stuff inside and out. This, of course, applies to new work; we do not get paid for doing old work in this way. But times have changed. Buggies are now used but two seasons, and are then used for a "hack" or run-about, and a new one bought for Sundays.



A Question on Shoeing.—I wish to ask my brother craftsmen the following question: What would you do with a horse that will wear out his shoes on outside of hind feet in from 15 to 20 days? Information as to kind of shoes and fitting will be appreciated. W. E. Murchison, Georgia.

Repairing Metal Wheels.—Replying to the inquiry of Mr. Wm. Crawley of Indiana on the matter of metal wheels—I do that trick by heating the tire in the fire the same as any other tire. I then put the tire in the upsetter and shrink it until it is down to its place on the tenons and the wheel is as good as new again. The condition spoken of is caused by the tire hitting on stones in the road and causing the tire to stretch.

C. W. M. Burroughs, New Jersey.

Wants a Weed Burner.—Does any brother know of a weed burner that would work similarly to the railroad weed burners? Something small that could be pushed or pulled by hand or horse. If any readers know of one, I would like to hear from them through The American Blacksmith or perhaps some brother would give plans for making one.

R. J. McLaren, Arizona.

In Reply.—The asphalt paving companies of the larger cities use a heater for repairing asphalt pavements that will no doubt prove to be just the thing Mr. McLaren is seeking. The makers of these heaters is the Volcano Torch and Manufacturing Company of Erie, Pennsylvania.

J. H. M.

Wants to Forge Fifth Wheels.—Would some brother kindly give the best and quickest way, together with illustrations, step by step or give me a template for turn-tables for buggies and wagons (fifth wheel, I believe the "Yank" term is)? I have never seen one in "Our Journal," barring malleable, and these are not suited to our style of buggies. Ours are all three reach under carriages, whereas yours are two reach. As malleable cannot be used in this country, we are compelled to make them from wrought iron. I hope some brother will oblige me. The reason I write to America is that Americans are recognized the world over to have the brains, so I want to see the outcome of American brain. C. H. Luhrs, South Australia.

Preventing Rim Scorching.—I note J. D. Ferrell's trouble with scorched rims when brazing tire wires. I have had my patience sorely tried by having a scorched rim when wires were brazed. I overcame the trouble by mixing fire or blue clay with water, making a good sticky mud plaster all around the iron parts of the wire grips, particularly in the side of the wires in which the holes are, and each side of rim and channel. Put on all that will hang firmly, keeping it well away from the wires and where you braze them. Put a piece of asbestos paper between channels and wires at joints and you will succeed without starting the paint. The clay looks mussy on nice paint but comes off without a scratch. W. L. Bliss, Massachusetts.

Copying Nature in Iron.—The forging of ornamental iron work is a very unusual occupation in the shops in this part of the country, for the simple reason that the smiths who could do it can't spare the time, and the town and country smiths don't seem to have the confidence in their ability to try their hand on this particular class of work. Now, please bear in mind, readers, I am not posing as an expert on this high class of work, but my ideas conform exactly with those of Mr. John A. Curley's when he wonders why it is bad to try and represent a natural flower or vine in iron. I don't think there's a workman in this world who is skillful enough to forge a duplicate of nature's flowers or vines and find no defects in the work. I followed Mr. Curley's methods of forging a rose and must say I am pleased with the result. I only forged one rose and three leaves. I got pretty close to nature but you may imagine I found many defects. I have confidence, however, that I can remedy some of these the next time. The more we practice and train our hands, the more skillful we become.

J. F. Rudd, West Virginia.

Several Tips from Oklahoma.—I have only been taking your paper three months and have already received more than enough information from it to pay for a year's subscription.

I see a lot about credit. I think the smiths should cut out credit. It is the worst thing a smith can do, to let work out on credit. If the craft got into the cash habit, they would like it better and it would be just as handy for the customer. I would rather let my hammer lie on the anvil than do credit work and wait until fall. My competitor does credit work and works cheaper than I do, but if you will watch us you will see me working when he is reading.

Here is my kind of plow tongs. Take two light pairs of common tongs with handles about 11 or 12 inches long. Weld the handles of one pair of tongs to the handles of the other. Bend the handles around until the jaws are about 6 inches or 8 inches apart, making two square bends or a circular bend to suit the user. This makes the best plow tongs I ever used.

Now, I would like to know if there is anything that I could get to harden plow shares and cultivator shovels that will work better than clear water?

This is a sandy country full of grubs and rocks. My shop is 20 by 24 and is fitted with hand tools. I have no machinery except a cold tire setter.

Thos. Marks, Oklahoma.

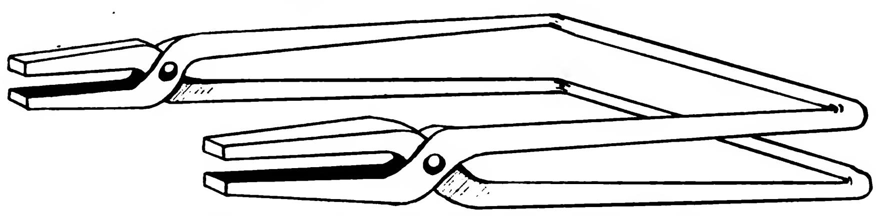
Another Hint on Metal Wheels.—Will you please permit me as a new subscriber to your valuable paper to say just a few words to Mr. Wm. Crawley of Indiana about his trouble with metal wheels. In the first place, shape up a steel bar from an old axle, drawing one end down flat. Split the point like the claw of a hammer so it will straddle the spoke at the shoulder under the rim. Now take an iron of proper length to set against the hub of the wheel and under the lever. Give your short spoke a good heat and see how easy you can bring it up to the rim. Now place the spoke in the vise and rivet it down. I have had some experience with this method and always with success. I hope this will be of some use.

C. P. Sharp, New York.

Some Smiths are Short-Sighted.—I think I can take the premium on an illustration of selfishness. An old blacksmith came into my shop when I was shrinking buggy tires with a home-made tire shrinker. He said that he could tell me of a way that beat that and started in to do so by saying; "Take an old 6-inch three-cornered file, break a piece from it about 2 inches long and lay it on the anvil. Get the tire red hot—" And just about that time he remembered that he was telling me something that would be a benefit to me and for which he would get nothing, so he would not finish the sentence,—in fact would not say another word about it. This, although it would not in any way have interfered with his trade as he has stopped doing job work and is working for a saw mill for wages.

I just write this to show how stingy some smiths are with their ideas. If I know anything that would benefit the craft, I should take a pleasure in telling about it so somebody could be benefited by it. If each smith knew only what he had found out for himself, there would be very little progress in the trade.

A. J. Panton, North Carolina.



A SET OF TONGS FOR THE PLOW REPAIRMAN

Wants to Exchange Letters.—I would like to correspond with some craftsman who is a subscriber to The American Blacksmith and who is also an I. C. S. student. William S. Whitbread, S. Aus.

Note—The Editor holds Mr. Whitbread's full address and will be pleased to give it to any of "Our Folks" who desire to write our Australian reader.

Questions on Several Matters.—In the May number Mr. G. B. Jewett says it would be a good idea if Stanford E. Frazell dropped his tools in a well if he couldn't weld the land side on a plow when it became unwelded. I suppose that the first time Brother Jewett tried a job of this kind he had no trouble whatever, and hasn't had since. I have tried about everything I could think of to weld some land sides on to the plow and could not do so. And I notice from the way some of them look when they come to my shop that there must be other smiths who couldn't. When a share comes to my shop all stuck up with burnt welding compound and some one has shoved a piece of thin iron in between the land side and the share and partly stuck that, I wish I could stand around and see Brother Jewett work on it. If anyone knows what to do with a job of that kind to make it stick, I for one would like to hear from him for I wasn't born with that knowledge in my head but would like to learn.

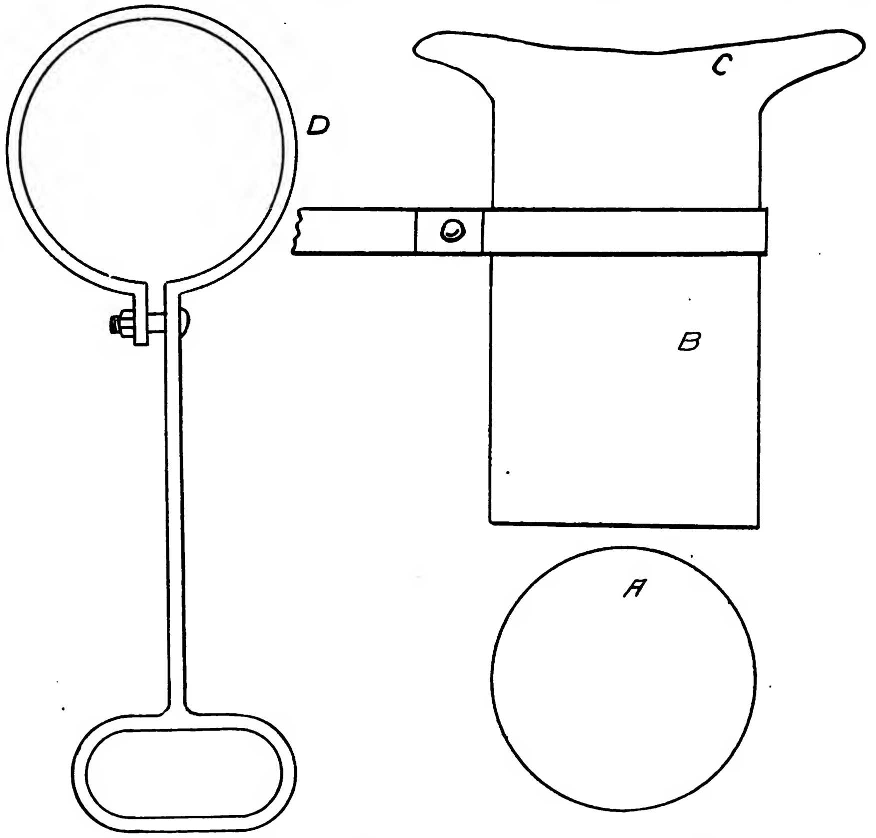
Will Mr. P. Lambert please explain his handy anvil tool in the June issue, a little more clearly. What kind of work can you use it for? What is bolt to left of illustration for? When you want to clamp anything with it, do you have to take wrench and screw off the top of the bolt that goes through anvil hole? I thank you in advance for information. Surely I am not the only "dead head" in the trade.

About Brother Shoop's bolt puller—What part of the puller is hooked on to the nail or bolt—is there a slot in it or what grips the nail while you pull? Handy little tools like these make light work for the smith. We need more of them.

Fred H. Pettit, Oklahoma.

A Babbitt Ladle.—Perhaps some one will be interested in knowing that if you take a piece of an old flue, a piece of pipe or anything of the kind that can be welded, cut off the desired length, cut out a round piece of iron A which will just fit nicely upon flue B, weld it in all around, draw out top like a pitcher spout C, put on a handle D and tighten, you will have a fine thing in which to melt babbitt or lead. I have a large one and a small one.

Fred H. Pettit, Oklahoma.



A LADLE FOR HANDLING BABBITT AND HOW IT IS MADE

On Tire Setting and Other Things.—I have never written anything for The American Blacksmith before, but I want to give Brother Huff a shot. He asks how a tire can be made smaller than the wheel by the cold process. I have set a tire on a wheel with West's machine, spokes 3 inches, felloes 3 by 4 inches, tire $\frac{7}{8}$ by 4 inches, and upset the whole business two inches after it became tight. I did this to see what the machine would do. Of course it spoiled the wheel, but I wanted to test the machine. Now, I say without fear of contradiction by any man that knows his business, that cold setting is the best. Some think a wheel can't be repaired with the tire on. If they are loose in the hub knock the box out and cut ends of spokes off. If the wheel is rim-bound cut a little out. If it is loose in felloe knock the tire partly off and wedge it. I hope Brother Huff won't take any offense from what I say, (and no one hired me to say it, either). Furthermore, I will give him or any other man 1,000 dollars in gold if I can't do just what I say. I want a machine that will surround the whole tire.

Now as I've got my thumb in it I want to give the young smiths a slash. I have worked at my trade for forty years and have worked in several different States. I say that no man has his trade learned if he can't make any tool which he uses in the shop. I have made my own cold tire setter. It cost me about fifty dollars. Can set either light or heavy without springing a spoke. I built my own band-saw and planer, and run a general business when I am not making tools for some of my brother chips. I put in the rest of the time turning hubs and spokes. I made the machines to turn them myself. Why don't the other smiths do the same? Now, I want to say the blacksmith is the father of all trades and I think it a shame that it should be misused by prosecutors and "scabs," as it is, for they are solely to blame for prices being as low as they are.

As I have said, I have worked for forty years at my trade and am learning faster now than when I first began. For this reason I understand the principles of work better now than ever before, and if I can be of any use to my brother smiths I will answer any questions that I am able.

James R. Dowd, Pennsylvania.

Home-Made Tools, Prices and Other Things.—In regard to shop-made tools I want to say: "Buy of reliable manufacturers such tools as you may need." I have tried the home-made saw and jointer tables and have not found them satisfactory, neither have I found the home-made hammers as good as you could buy of the man who makes it a business to build them. I have made several hammers, but had I worked at some other work and put in the time that I did on those hammers, forging, grinding and polishing, I could, with the money, have bought three times the amount of hammers. It is the same with drills, reamers, etc., in my shop.

I see a great deal spoken of in these columns on the subject of price cutting. I have the best and most complete set of tools in this County of Jackson and know no other smith's prices for the work he does. I have my own price and stick to that, and I never say that any smith is not a good workman. I would advise all young smiths never to talk and run down their competitors, because it is the cheapest advertisement that your competitors can get and you are giving it to them free of cost and also injuring yourself. Rather say a good word for them.

I dislike very much to have a jobber's drummer come into my shop and begin his talk, running over stock lists, etc., and I suppose you boys do, too? I just simply tell him to wait and then I reach for a book telling what we are short on and what we want in the way of bolts and other stuff. I then get the bill of the same supplies bought before, get a sample of the different articles and show him. He will soon pack his grip and get out of your way and will

hardly bother you again because he knows you keep posted and buy to save money and yet get as good or a better line of goods. We do not buy to undersell. We carry a stock of hardware and manufacture all our wood work except wagon spokes and plow handles. These latter we buy, paying cash on delivery of goods. We buy no other way. Pay for nothing until you receive it, and run your shop and business so that you can look any man in the face and tell him to go to—. By paying cash you will never buy too much or more than you can pay for. This one thing is the stumbling block for most all business failures, as a great many realize after it is too late. The drummer will stuff you with orders, and many stuffed orders of unsalable goods as the dull season comes on will ruin the boys unless they have unlimited resources.

J. D. Skidmore, West Virginia.

A Letter From South Africa.—I must say that I am pleased with "Our Journal" and am sure that it is worth the money many times over. I saw in a recent issue that a South African smith was cracking up sheep dung for heating tyres in the open. Well, it may do when one can get nothing else, but give me good wattle wood every time. We get a good deal of tyreing to do here, from 1 inch by ½ to 4½ by ⅞, and I always find that wood fires are the best. I have used cow dung, but it takes too long to get hot to suit me.

I would like to ask some brother smith for his opinion of the horseshoeing stocks which I see advertised in "Our Journal." According to the illustrations I see, the horse is standing, except for the foot that is fastened. I used to have some very bad mules to shoe in Greytown, Natal, but the stock we used there was a fixture in the open field, and we used to hoist the mule quite clear of the ground with a couple of pulleys off the top cross bar. After he was up we fastened each foot to a post (of course padded) and then worked at him. You can understand that the mule, once he was up, could be very quickly shod, as there was no letting down of one foot to pull up another. Of course, to pull him up we used a wide belly girth, his whole width, in fact, with hind quarter band and chest band. I have been wondering how the stocks advertised can be so good if the horse or mule has the freedom of his other three legs with which to struggle. I have no stock here, so have to throw the bad horses and mules, but working at a mule that is thrown is a very awkward business. I would like to see Brother Phifer trying the persuading voice with a few horses I have to shoe. He might manage to shoe them after a month's persuasion, but I cannot afford to be a horse trainer and shoer all for the same price. It would not pay. I would really like to know from one of the brethren if the stocks, such as the Hemphill, are really effective.

I see in "Our Journal" a lot about welding of spring plates. We get a lot to do here, and I have tried several ways to weld them and have found none better than splitting each piece of the plate after thinning down for a scarf. I then make them both a fair red heat, and after locking them together by lapping the scarfs I close each split down with a piece of Laffitte welding plate between each. I next take a bright red heat (not white) and let the striker hit on the set hammer, as I find this way better than striking on the spring plate itself. The Laffitte welding plate I find very good, and have welded the prongs on garden forks and found them hold together well.

Henri Leppard, Natal, South Africa.

MR. ROBINSON'S WELL-EQUIPPED POWER SHOP OF TENNESSEE

Plow Work, Shoeing and Tire Setting.—I also thank the editor as well as all the brothers who have contributed so many interesting as well as practical hints to our Journal during the past year and made it what it is today. It is not very often I see anything from North Dakota brothers in the Journal's columns. We must either be too busy or too lazy. Let us join hands, brothers, and drop the Journal a line now and then to exchange our ideas and let our distant brothers know that we are not "froze up," but that we also read The American Blacksmith. I must admit that I am of better credit to myself behind the anvil than I am with printer's ink. I shall not endeavor to preach you a sermon, however, but simply make a few remarks relative to our trade.

I do all kinds of work. Very seldom I turn a job down or say it can't be done. My specialty is plow work and horseshoeing. I do a lot of plow work in a season. I have the most experience in dealing with gang, triple and steam plows, also sulky and walker prairie breakers.

To insure easy and perfect running, a lay must be perfectly level from point to heel, with the exception of prairie breakers, which must be rolled up on heel, more or less, according to the requirements of the plow. I give the stubble lays a cherry red heat along cutting edge and dip perpendicular in water, point first. When this method is used there is little trouble with marking. Generally, we have to polish the lays. There are usually many different ways of doing different kinds of work, but if you are going to make a plow run correctly there is only one way for getting the best results.

In regard to horseshoeing, a good many views and ideas have been exchanged in the columns of "Our Journal," and most of them have been practical, but will admit that some are rather complicated. For interfering behind I have good success with level trimming and snugly fitted shoes and shoes leveled on block (in nine cases out of ten I have been successful). With level trimming and careful fitting there are very few horses go lame out of my shop. Use common sense. Take pride in your work and your customers will be your best advertisement.

Some time past the Journal columns were filled with the war cry on tire setting—hot and cold. I am not going to contradict any of my brothers' arguments, for a mechanic who knows his business and has a good machine can do a good job either hot or cold. Occasionally I come across a tire I think I can do a better job hot than cold, but not very often. My way of setting cold tires is: If the spokes are loose I take the tire off, wedge it up, slip the tire on again, set in the machine and draw up, and it is ready for bolting. If I have a wheel with just a loose tire I loosen the bolts all around and set in machine and draw up (generally in two or more places, according to how loose it is), and tighten up bolts again. By loosening the bolts I find that the wheel is not dished before the tire starts to tighten. I have a Scientific Hydraulic Machine, and I am confident it does not need to be ashamed to stand the test with any edge-grip setter on the market. This is my experience with cold-tire setting.

I. W. Meinhardt, North Dakota.

A Power Shop of Tennessee.—The engraving shows the interior of my wood shop which is 28 by 42 feet. The picture does not show all of the tools. My equipment consists of a 6-H. P. Fairbanks-Morse engine, one double head pony planer, one 30-inch band saw, one rip saw table, one wood-turning lathe, one tenon machine, one emery stand, one 22-inch grindstone, one mortice machine, one rubber tire machine and I am building myself a jointer.

I do shoeing and all kinds of repair work. I get a pretty fair price although there are two other shops here who are acting the scab. I am getting \$1.20 to \$1.50 for shoeing while they are shoeing for \$1.00 and that is a pretty hard proposition to butt up against. I am in favor of fair prices and good honest work. They have only been here a short time, while I have been here twelve years. J. G. Robinson, Tenn.

VOLUME 10

NUMBER 12

THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO
N.Y. U.S.A.

SEPTEMBER, 1911

$1.00 A YEAR
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Calk Warning for 1911-12

Horseshoers' profits to be cut next winter on many brands of Calks.

Don't buy any Calks because they look cheap unless you know what next winter's resale prices to Horseowners are to be.

Prices to Horseowners on certain well-known Calks to be cut next winter and Horseshoers will lose much profit.

Ask every Salesman or Jobber who offers you any Calks for next winter, except Ring-Points, Juniors and H Calks, to Sign the Agreement Below:

....1911
(Date)

To..
(Write your name here)

....
(and your address here)

We hereby guarantee that the manufacturers of ....
(Give name of Calks you want)
Calks have established the following minimum resale prices to Horseowners on their Calks for the winter of 1911-12 and that said prices will not be reduced during the season:

Lowest Eastern Prices per 100 to Horseowners:						Lowest Far Western Prices per 100 to Horseowners:					
5/16	3/8	7/16	1/2	9/16	5/8	5/16	3/8	7/16	1/2	9/16	5/8
$2.70	$2.90	$3.20	$3.50	$3.70	$4.30	$3.00	$3.30	$3.60	$3.90	$4.20	$4.80

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William F. Wendt, - - President.
Albert W. Bayard, - - Secretary.
Walter O. Bernhardt, - Editor.

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James Cran. Harold W. Slauson
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Subscription Price: $1.00 per year in advance, prepaid to any postoffice in United States or Mexico. To Canada and other countries, $1.50, or, 6 shillings. Reduced rates to clubs of five or more on application. Domestic long-time rates, strictly in advance: Two years, $1.60; three years, $2 00; four years, $2.50; five years, $3.00. Single copies, 10 cents. Cable address, "Blacksmith," Buffalo.

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Contents, September, 1911

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Readers as Contributors

Quite a goodly number of our readers consider it their duty to contribute regularly to our columns. They feel that it is part of their obligation to the craft to discuss and talk freely on the subjects continually being brought up, and it is needless to say that these of "Our Folks" are getting maximum returns and value from "Our Journal." They are heart and soul in the craft and are as a result reaping their just reward. But it is not especially to those readers that this talk is directed. We want those of "Our Folks" who have read and enjoyed the articles month after month, who have profited by the information—yet have never been represented in these columns by an article or letter of any kind—to these readers we want to extend a cordial invitation to write whenever and as often as they possibly can upon some subject in which they are interested or in which they feel other brother readers will be interested. Our columns are always open to discussions on up-to-date craft matters and we want every reader of "Our Journal" to feel that it is part of his duty to the craft to write an occasional item for publication.

Never mind about the literary style, the spelling or the punctuation—what we want more than anything else is the idea, the hint, the kink or the particular method. We will see that your article reaches "Our Folks" in proper dress. Surely you know lots of unusual kinks and methods which are not generally known to the craft at large. If you employ any special machines let us hear about them; if you have built any machines for your own use, others will certainly be interested. Your brother craftsmen are just as glad to hear from you as you are to hear from them. So let us have something from you for publication in the near future. And the best way to do a thing is to do it now.

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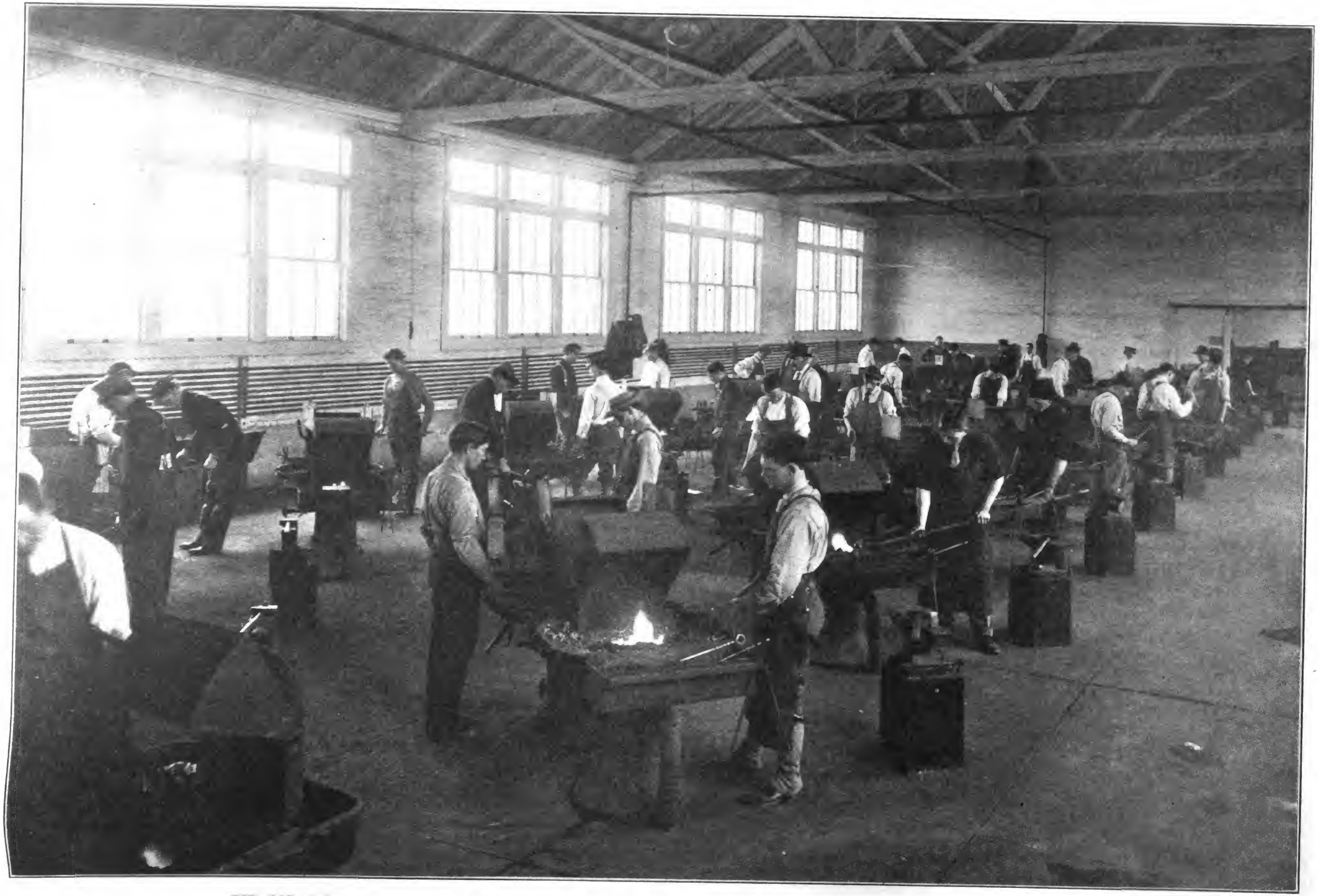
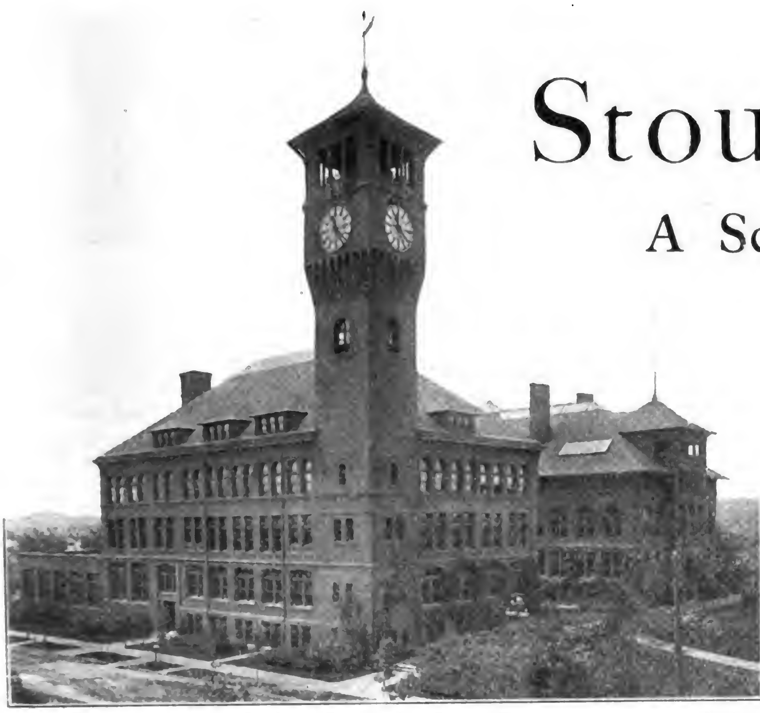
All authorized agents, solicitors and canvassers representing THE AMERICAN BLACKSMITH are supplied with proper credentials which they will show you on demand. Don't hand money to strangers or to any one who cannot show you that they are an authorized representative of THE AMERICAN BLACKSMITH. And when in doubt, send your remittance direct to Buffalo—give us the name of the solicitor and we will give him proper credit.



THE FORGE ROOM AT THE OREGON AGRICULTURAL COLLEGE IS WELL LIGHTED, AIRY AND FINELY EQUIPPED



Stout Institute

A School For Teaching Instructors

THOMAS F. GOOGERTY

PERHAPS it may interest you to know that in the beautiful little city of Menomonie, Dunn County, Wisconsin, situated on the North Western Railway, sixty-two miles from St. Paul, is located one of the largest and best special teachers' schools in the United States—the Stout Institute. Six years ago Mr. L. D. Harvey, the President of the School, organized it with eleven teachers and an enrollment of fifty-nine students. The present enrollment is over four hundred students with twenty-seven teachers.

Until 1908 the work was carried on under the direction of the Menomonie School Board, in connection with the public school system. Since then the training schools for manual training and domestic science teachers with trades schools for plumbing and bricklaying, the home-makers' school and the school of physical culture have been reorganized and incorporated as the Stout Institute.

Mr. Harvey insists on every instructor thoroughly knowing the subjects he is teaching and to be able to impart his knowledge to the pupil, hence the success of the school.

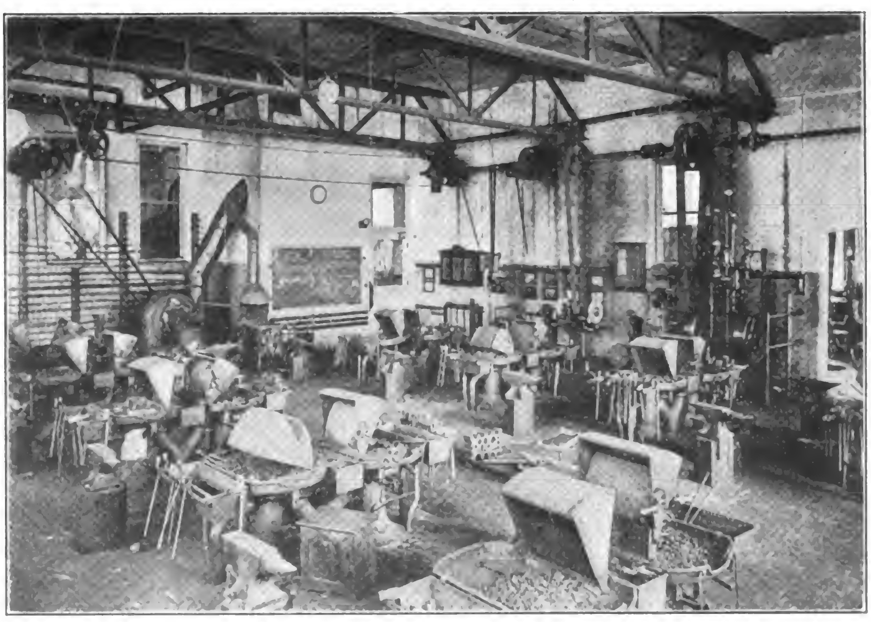
The Institute also holds annually a summer school. The 1910 School was under the direction of George Fred Buxton, assisted by twenty-one teachers giving instructions in forty-three courses, commencing August the first and closing September the second. This was the largest ever held by the Institute, having an enrollment of two hundred students. The object of the summer session is to give to teachers who are engaged during the regular school year a chance to combine study with rest.

Perhaps the readers of THE AMERICAN BLACKSMITH are interested more in the metal work, such as taught in this school. Instructions were given in machine shop practice, foundry work, art copper and jewelry work, elementary forging, tool smithing and ornamental iron work.

The forge shop is a modern one and situated in a well-lighted room, 60 by 110 feet. It is equipped with twenty-three Buffalo down-draft forges, a power hammer, drill presses, emery wheels, vises and benches, also a full set of anvil tools and tongs with each forge. The school carries a large stock of iron and steel of all kinds, so that there is no delay in waiting for material to do any ordinary work. Mr. Wm. T. Elzinga, the forging instructor, has had many years' experience as a teacher and worker of iron.

During the summer session thirty-nine students enrolled in the forge shop. These were divided into two classes, two hours and fifteen minutes being given to each one. There were twenty-two students taking elementary forging and seventeen taking tool and art smithing.

The instructions in elementary forging consisted of the care of forge and tools, how to build and maintain the proper fire, the right position to stand while at the anvil, and how to hold and hammer iron with a hand hammer. Nearly all the exercises given involved some welding. The first one given was two pieces of iron,



THE WELL-LIGHTED FORGE ROOM AT STOUT INSTITUTE

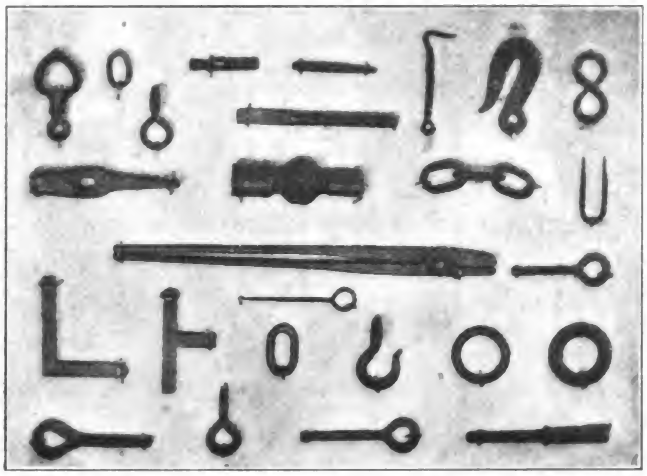


FIG. 1—SOME OF THE SIMPLER WORK DONE BY STUDENTS

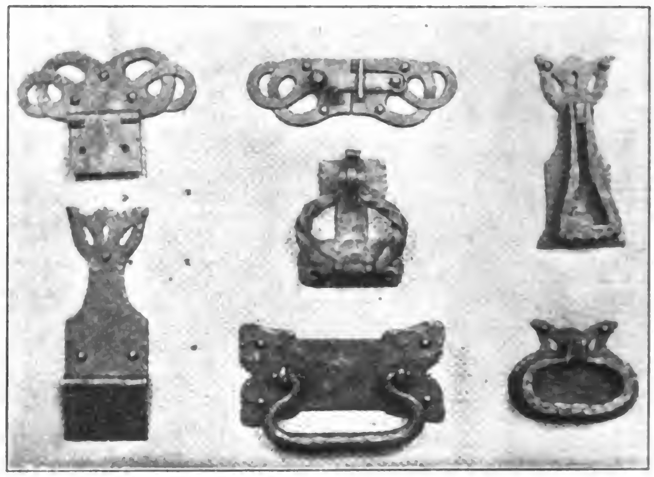


FIG. 6—DRAWER-PULLS, HINGES AND A LATCH MADE AT STOUT

6 inches long by 3/8 inch square, or some scarp pieces about this size. .

One piece is laid on the side of the other and a heat taken and the two welded and drawn to 3/8 inch square. This bar was then heated in the center bent over the horn of the anvil until the two ends meet. A ring, 1½ inch in diameter, is then formed in the center of the piece, the balance of the bar is heated and welded, drawing the shank down to 3/8 inch square again. This part is then formed in a loose ring on the end.

These pieces are shown in Fig. 1, also some other work which involved welding. Considerable time was given to the end scarf weld. The object in giving exercises that involved welding is to get the student familiar with heating and working iron as soon as possible, as one who does not understand heating iron cannot work it.

FIG. 2—AN ORNAMENTAL LANTERN OF PLEASING DESIGN

A great many seem to think that simple welding of this character is very difficult; they also think that you must be very quick to handle it. This is not true, but what is necessary is to have everything ready; the fire must be clean, the hammer in its proper place on the anvil and then to get the right heat and make every move count by going slow instead of fast.

FIG. 4—A PORTABLE LAMP MADE BY A STUDENT

The work in tool steel consists of forging various kinds of tools, and demonstrations are given by the instructor in hardening and tempering of hammers, chisels, punches, lathe tools, taps, springs, thin milling saws, case hardening and the blueing of steel.

All of the students who enrolled in the ornamental iron class previously had some instructions in forging, some of them had worked at the blacksmith trade.

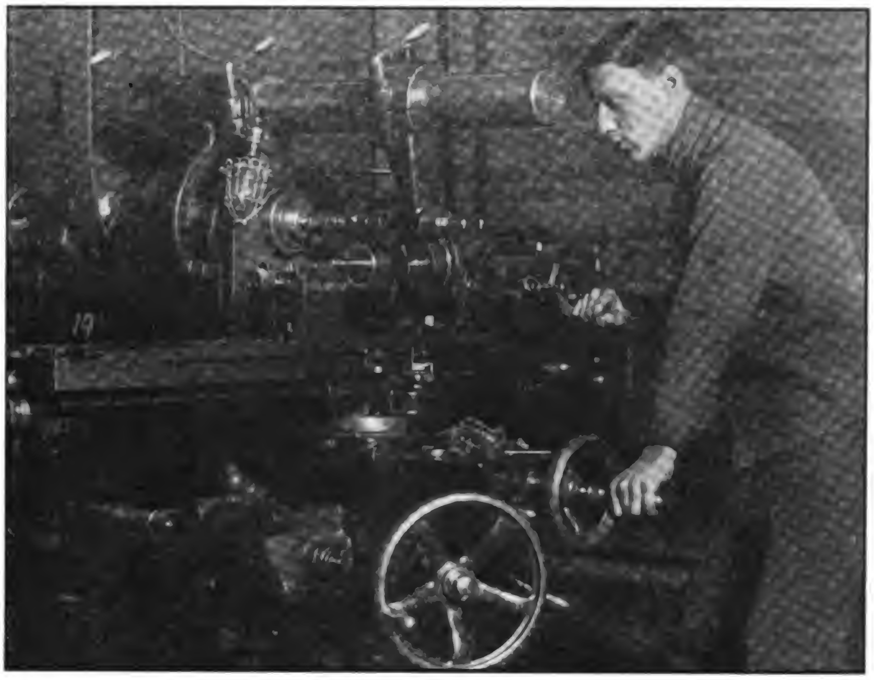
The work in ornamental iron consisted of making drawer-pulls, hinges, latches, pokers, shovels, portable lamps, hall lanterns and ornamental forgings of various kinds. Fig. 2 shows one style of lantern, made and fitted with art glass and chain pull socket. Figs. 3 and 4 show portable lamps. Fig. 5 shows similar work made at this school. Fig. 6 shows hinges, drawer-pulls and a latch.

In the working out of decorative pieces in the forge shop the school encourages students to enter the design class in order to work out their ideas first on paper. These designs are then taken to the shop and constructed. The design class is in charge of George Fred Buxton, who has devoted many years to this subject.

FIG. 3—THE RANGE OF DESIGN FOR LAMPS IS UNLIMITED

The Technical High School at Buffalo

The Technical High School at Buffalo, N. Y., is a free institution chartered by the State Board of Regents and maintained by the City under the jurisdiction of the Superintendent of Education. The purpose of this school is to supply systematic instructions to those whose activities will be along industrial lines, and to those who are preparing to enter schools of engineering and other higher technical schools. The evening classes meet the needs of those who are seeking advancement in their daily occupation or who desire greater proficiency and technical knowledge.



OPERATING A UNIVERSAL MILLING MACHINE AT BUFFALO TECHNICAL HIGH SCHOOL

Two courses of study are offered—the Industrial Course and the Technical-College Preparatory Course. The first is designed especially for those students who are not likely to enter higher technical institutions and whose natural abilities and inclinations are along mechanical lines. This Course differs from the College Preparatory Course in that a greater amount of shop work and drawing is required, no foreign language offered, and a closer relationship between mechanical work and mathematics, history and science maintained. The Technical-College PreparatoryCourse as its name implies, represents a definite effort to prepare students for admission to schools of engineering, civil, electrical and mechanical, as well as to those scientific and professional schools requiring or recommending preliminary technical training. By proper selection of subjects a student may prepare himself for entrance to any of the higher institutions in this country.

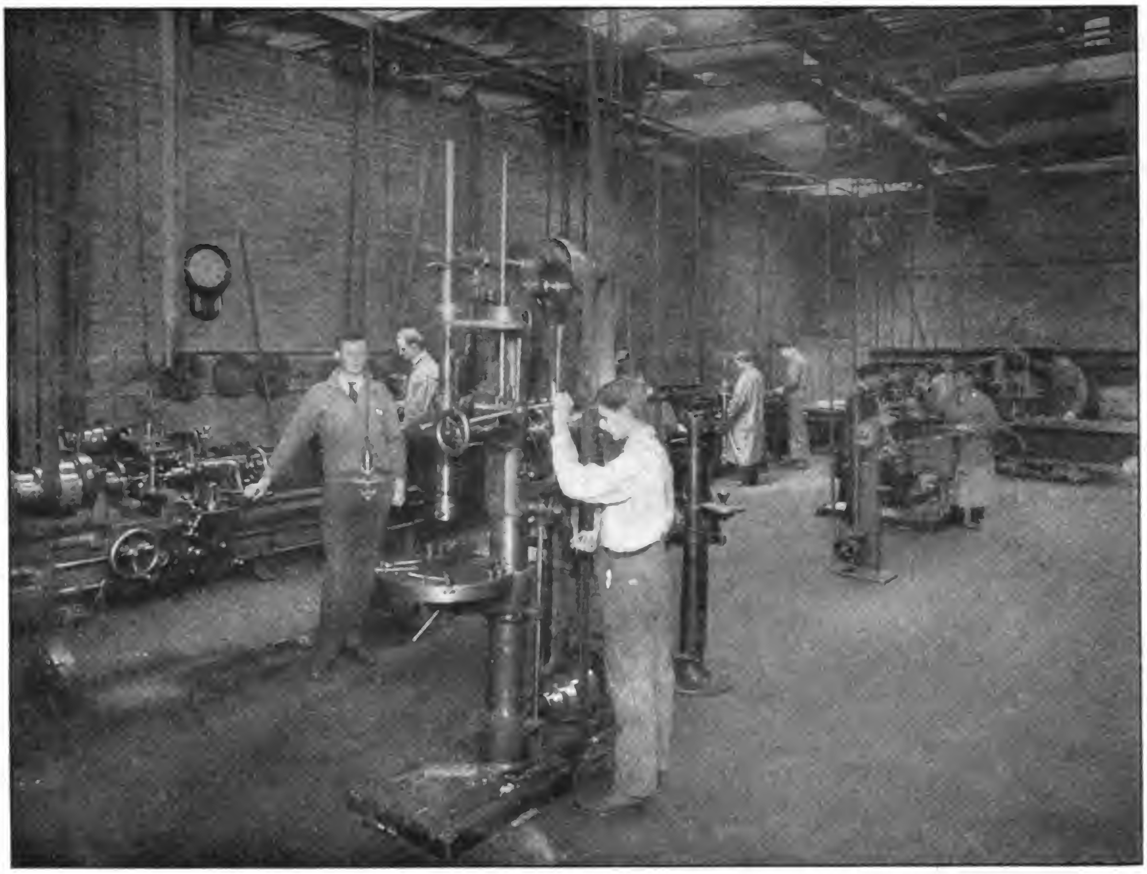
FIG 5—SOME EXCELLENT EXAMPLES OF METAL WORK FROM STOUT INSTITUTE

In the technical training courses instruction is given in the fundamental principles, processes and practice of joinery, cabinet making, wood turning, pattern making, forging and machine shop work, and extends over the entire four years of the school course. Correlated with these courses are the courses in drawing, which afford instruction in free-hand, mechanical and architectural drawing. The drawing work is taught with special reference to its relation to the commercial and industrial world.

The purpose of the technical training course is to give students an insight into modern shop methods and processes, to teach them the fundamental principles of the various trades included in these courses, and the value and importance of time, labor and material, as well as orderly arrangement, neatness and accuracy, to provide opportunities for acquiring dexterity in the manipulation of various tools and instruments; the ultimate purpose being to prepare

students to cope with industrial conditions and to adapt themselves to the scientific and engineering courses of colleges and universities.

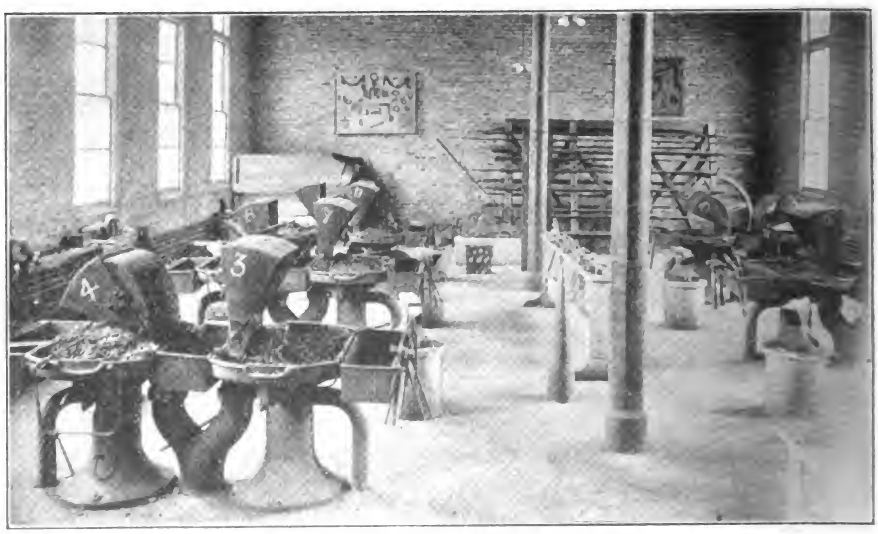
In the wood-turning courses the student for the first time is brought to the knowledge of power-driven machinery. Instructions are given regarding the speed lathe, its various parts, kinds of wood to which it is adapted and methods of operation, after which actual practice in the operation of the lathe and the use of tools is afforded. When simple exercises requiring work between centers as well as face plate and chuck work have been satisfactorily completed, the knowledge and skill acquired thereby is directed to the production of useful articles.



THE WELL-EQUIPPED MACHINE SHOP AT BUFFALO TECHNICAL HIGH SCHOOL IS LIGHTED FROM ABOVE

In the course of joinery the time requirement is forty weeks and six or four periods each week. At the outset carefully graded exercises involving the principles and processes of joinery are assigned, after which useful articles requiring the application of those principles and processes are produced. In every instance the student is required to make a satisfactory working drawing of the object prior to its actual construction. The following subjects are treated during the course: The care and use of tools, measuring and laying out of work, planing, sawing, chiseling, boring, nail and screw driving, mortising, forming, finishing, staining, varnishing, splicing, mitering and gluing, dovetailing, tongue and grooving, angle joining and irregular shaping. From time to time talks and illustrated lectures are given on some of the following subjects: The composition and structure of wood, kinds and qualities of wood, warping, preservation of wood, selection of lumber, and lumbering and milling.

The course in forging is designed to cover the various processes of forging, including bending, twisting, upsetting, splitting, punching and forming, fullering and swaging, welding, case hardening, annealing,



A CORNER OF THE FORGE ROOM AT THE WISCONSIN HOME FOR THE DEAF

tempering, tool making and dressing and assembling. These processes are applied in the making of the following articles: Gate hook and staples, angle irons, ice pick, welded chain, log chain hook, bolt head, straight lipped tongs, scratch awl, center punch, flat drill, twist drill, square reamer, screw driver, cold chisel, cape chisel, lathe tools, knives, hammers, hinges, door knockers, draw pulls, gas tongs and irons. An important feature of the course is the series of lectures given from time to time and covering the following subjects: Reduction of ores, manufacture of cast iron, wrought iron and steel, properties and uses of special grades of steel.

The subjects taught during the first year of the Industrial Course are: English, Algebra, Industrial Geography, Personal Hygiene, Joinery, Wood Turning, Free-Hand Drawing.

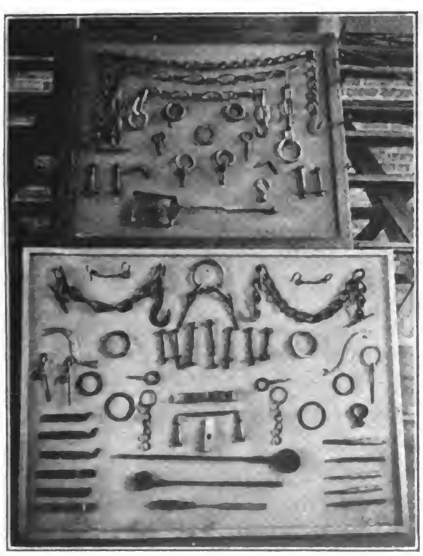
The second-year subjects are: English, Geometry, Elementary Mechanics, Industrial History, Pattern Making and Moulding and Drawing.

The following subjects are taken up during the third year: English, Shop Mathematics, Physics, Forging, Elementary Machine Shop Work and Drawing.

The fourth-year subjects consist of the following: English, Chemistry, Advanced Mathematics, American History and Civics, Principles of Manufacture, Advanced Shop Work and Machine Design.

To acquaint students with actual industrial conditions a series of industrial trips is carefully planned each year with special reference to the needs of students, and all seniors are required to make a definite number of these trips during the year. While the school assumes no obligation in the matter of securing positions for its graduates, nevertheless, it has been the practice to keep graduates informed with regard to desirable positions.

TAKING A HEAT AT BUFFALO TECHNICAL HIGH SCHOOL



SOME WORK DONE BY DEAF MUTES AT THE WISCONSIN SCHOOL

The building of the Technical High School will accommodate five hundred students. In the main portion of the building are located the office, library, assembly hall, class rooms, joinery shop, wood turning and pattern shop. Situated in the rear are the forge shop, machine shop, chemical and physical laboratories and science lecture room.

No tuition fees are required from resident students, but a deposit of two dollars is required at the beginning of the year to cover the cost of text books loaned. Non-resident students must pay a tuition fee of twenty dollars each term in advance. This covers cost of instruction and use of ordinary school materials.

EDITOR'S NOTE—We are indebted to Mr. A. S. Hurrell, Principal of Buffalo Technical High School for the use of illustrations and for description of the school courses.

Edward Puls

Locksmith, Blacksmith, Designer and Worker in Ornamental Iron

Toward the middle of the nineteenth century there began a revival of the iron-working art in Europe—an art which had, since the Rococo period, declined considerably. This awakening seemed to find an emphatic re-echo in the heart of a young German locksmith, named Edward Puls. This young mechanic, in 1861, while not yet twenty-two years old, opened a small shop in Berlin in an effort to reanimate this art. As an

CONSIDERING THE EVIDENT CRUDITY OF THEIR MATERIALS THESE ANCIENT FOUNDERS ACHIEVED WONDERFUL RESULTS

apprentice he had studied designing under Risopp and had later completed his art education while traveling in Germany and Italy. So here in his little shop in Berlin he endeavored, unassisted, to awaken the art of iron working.

Fate ordained that the task of repairing old iron work should be assigned to the young Puls, and, naturally, he interested himself more and more in antique iron work, its design and execution. This led him to attempts at imitation and to produce something similar. Thus he worked and planned, gradually gaining the recognition and encouragement of the prominent men of the time, until from all sides orders began to come in upon him.

The little locksmith's shop developed into an establishment of renown, and this establishment showed at the Berlin Industrial Exposition, in 1879, some works of art in iron that set the world to wondering. Prominent among the pieces exhibited were the masses of iron, which, treated with a true artistic spirit, formed the gates of the Berlin Arsenal. These gates were described at the time by one appreciative onlooker, who said: "Cyclops seemed to have wrought and welded these iron volutes; in their hands the material became plastic wax." And many times did the firm of Edward Puls perform these Cyclopean tasks, perhaps the mightiest of which was the making of the great gates constituting the Eosander Portal of the royal palace. These gates are 24½ feet broad and 33 feet high, the decorative cop alone being almost 10 feet high. Each gate weighs more than a thousand pounds. And this gigantic piece of iron work, which by reason of its aspect of dignified repose as well as its fineness of detail, captivates and astonishes the observers, surpasses in size the largest pieces of artistic iron work which have ever been forged.

THE ANCIENT GREEKS AND ROMANS KNEW IRON BUT DID NOT CAST IT

The Berlin Exposition made the name of Edward Puls famous. Formerly only the architect and builder had known about his work. Now all the artistic circles became interested in the man. Often ladies and gentlemen of the best society crowded his shop to see how the tough metal became transformed under the hammer of the skillful smith into vines, flowers and even charming and grotesque forms.

At that time few draughtsmen or locksmiths took willingly to designing and working out of ornamental iron. The very elements for the work had first to be made. And that, too, must be credited to Edward Puls. From his work the entire Berlin art-iron-industry—known the world over—grew up. In his workshops he trained apprentices who became good master-workmen and who could vie even

NOT UNTIL THE RENAISSANCE PERIOD DID CASTING BECOME KNOWN

with him. After thirty-five years of hard, honorable work the old master was laid to rest on Oct. 1, 1896, his good work being carried on by his sons.

In 1898—two years after the death of Edward Puls—the locksmith's little shop had grown to an establiehment employing one hundred and eighty men and having an equipment of modern drill presses, power hammers, shears, punches and thirty-one forge fires. This establishment, from a beginning when one man planned, cut, forged and finished, in 1898 had grown to a collection of departments or shops where each section or part of the work was done by different men. For example, the modern establishment has its own drafting department, a shop where the smaller pieces are forged, another shop where larger or intermediate pieces are formed, another where the largest and heaviest forms, requiring power cranes, are handled, and a department where all parts are brought together and assembled.

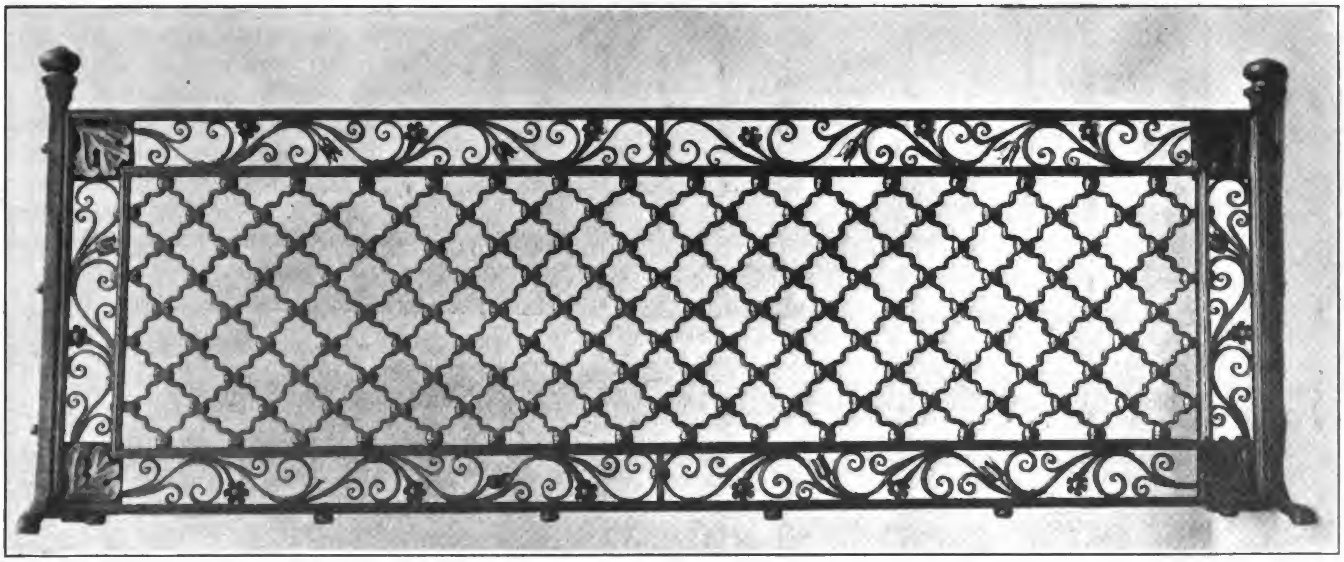


FIG. 1—A FLEMISH GRILLE OF THE SIXTEENTH CENTURY THAT THE IRON WORKER WILL FIND HARD TO IMPROVE UPON

The plan of the architect cannot in itself be considered as the basis of a piece of wrought ironwork—only the detailed drawing made by a practical draughtsman having a knowledge of the possibilities and limitations of smithing can serve as a foundation of the smith's work. Both designer and smith must work together in order to create as complete a work as possible. Edward Puls was both a designer and a smith.

Examples of Ancient Iron Casting

The Ancient Greeks and Romans knew iron but they were unacquainted with casting. They produced their iron in open hearths or in small ovens, with the aid of natural wind draft or with a primitive bellows. They thus produced a material having somewhat the character of malleable iron. This metal they used for such articles as could not well be made of

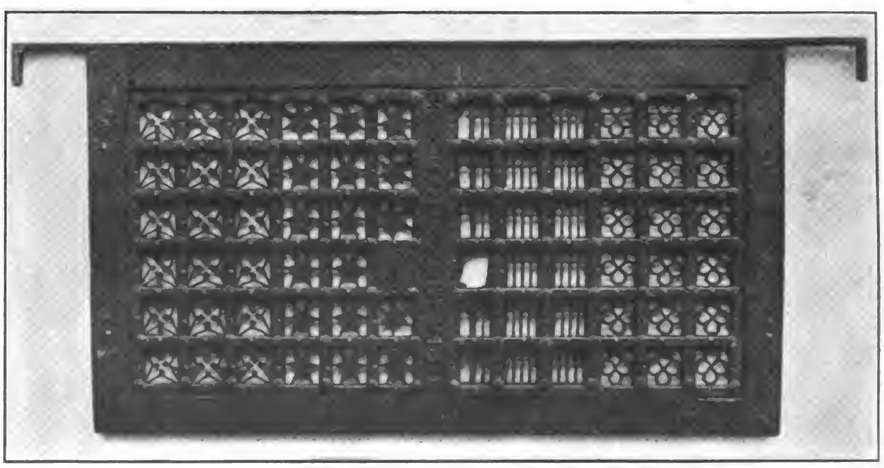


FIG. 2.—AN OLD GERMAN CASEMENT GUARD THAT SHOWS EXCELLENT DESIGN AND GOOD WORKMANSHIP

any other material—such articles were seldom given an artistic form and were very exceptionally other than articles of utility.

It was not until the Renaissance Period that iron-casting became known. The smiths and hand-craftsmen of the Middle Ages knew nothing of casting, and even when introduced during the Rennaissance Period iron-casting could not in its primitive stage compete with wrought iron. It was, in fact, limited to the making of fire backs and stove plates. The several engravings show examples of the cast fire-backs turned out by these ancient ironfounders, and, considering the very evident crudity of the materials with which these craftsmen had to work, the results they achieved are short of wonderful. All of the examples shown are English productions, as may be evinced by the design upon the middle plate in the engraving showing three plates.

Three Ancient Grilles of Exceptionally Pleasing Design

The three grilles shown are all of very pleasing design and show great skill not only on the part of the workman but the designer as well. Fig. 2 is undoubtedly an old casement guard. It will be noted that the iron part consists of two hinged gates or doors and an ornamented center bar. The lock on the door on the left is still intact, while that of the other door has evidently been removed. The designs used on each door are different and yet very pleasing in their contrast. The center bar is also ornamented in a very neat manner. This grille is of German forging and dates back to the sixteenth century.

The early Italian smiths and designers of iron generally adhered to a tasteful simplicity in their work. They were seldom, if ever, found overloading their doors, grilles, etc., with ornamentation. An excellent example of this very tasteful simplicity of the early Italian smith is shown in Fig. 3. This is an Italian grille of the sixteenth century. One must admit its simplicity, freedom from over ornamentation and yet, withal, its very pleasing appearance.

The grille shown in Fig. 1 is a Flemish production, also of the sixteenth century. It is a very handsome work and shows an exceptionally high degree of skill on the part of the smith.

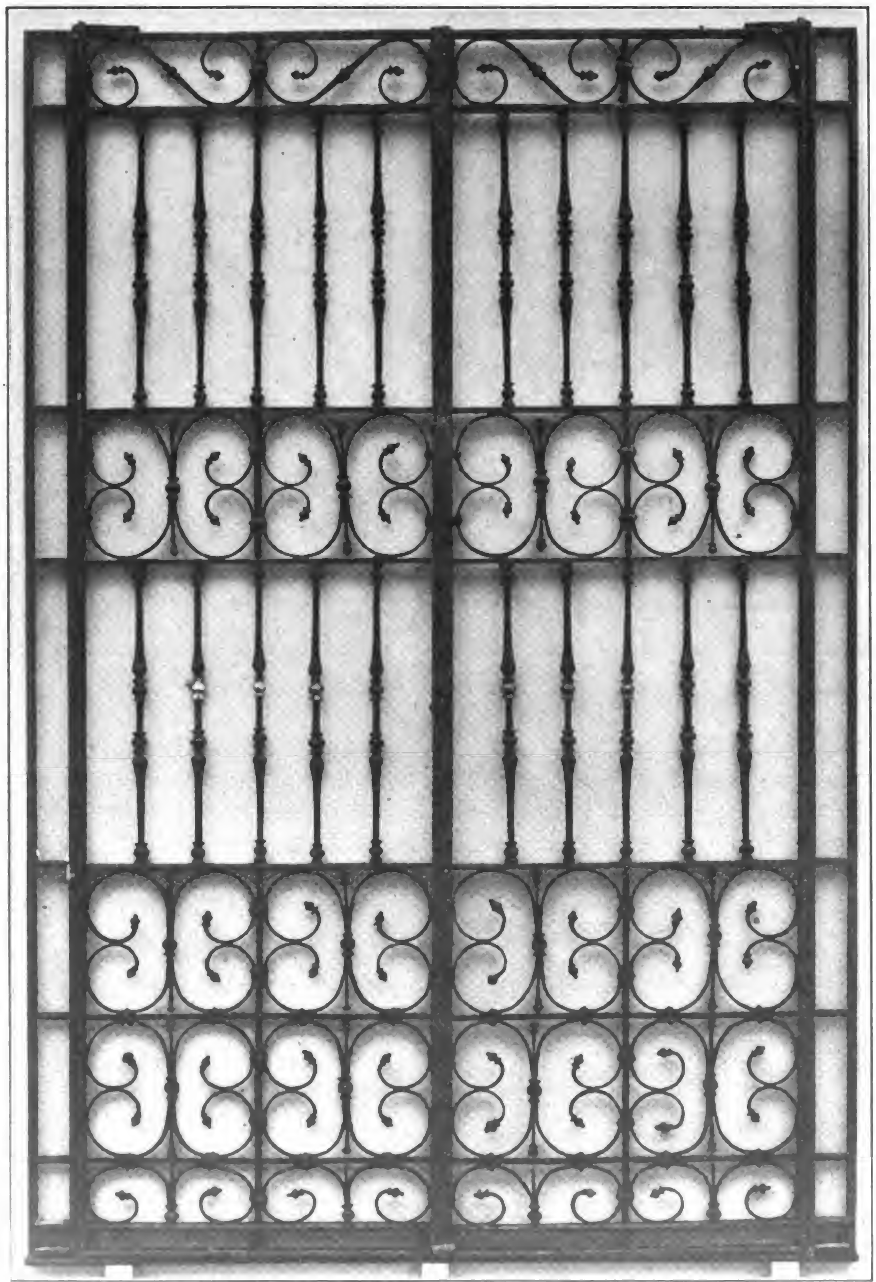


FIG. 3—THE SIMPLICITY OF THIS EARLY ITALIAN DESIGN IS EXCEPTIONALLY PLEASING

A Trio of Pulley Hints

J. W. Bagley

How to Cover Pulleys

Many consider the covering of a pulley quite a difficult undertaking, but this is not so if properly handled. First remove the old cover and renew the wedges (if wedges are used). Select a piece of leather of good quality, a little wider than the pulley to be covered and 3 or 4 inches longer than is necessary to go around the pulley. Place the covering in lukewarm water and leave it for an hour or so, or until it becomes soft and pliable. Square one end and nail it to the wedge, using nails just long enough to clinch as they pass through the wedge, and strike the body of the pulley. Take a clamp of some kind—wood preferred—and clamp to the covering; with a pry stretch the covering up to the next wedge and nail as with the first end. Continue this operation until the last wedge is reached, when the extra few inches left on the cover will come in very handy for fastening the clamp to. After nailing the end to the last wedge cut to the proper length and trim the edges of the cover down to the rim of the pulley and the job is

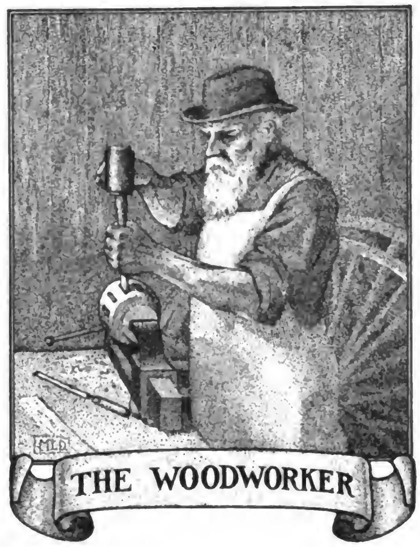
complete. In case no wedges are used and the covers are riveted onto the pulleys the same method will be found to work very well.

Keying Pulleys

In order that a pulley be properly keyed to the shaft a key must be of equal width its whole length and fit the seats on the shaft and in the pulley very accurately. The thickness should vary just enough to make the taper correspond with that of the seat in the pulley. In driving the key it should be driven just tight enough that it will not work loose. In most cases the hubs of the pulleys run against boxes, and in keying these pulleys on, about one thirty-second of an inch should be left between the box and the pulley, for in driving it tight up against the box it would have a tendency to heat and destroy quite a little power. In case the key is too thin, but fits other ways very well, it may be made tight by putting a strip of tin between the key and the bottom of the seat in the pulley.

To Remove Keys

In case the key projects from the pulley and has sort of a head on it, a pair of pincers or some similar instrument will prove valuable in removing it. Catch the end of the key and at the same time, with a hammer, drive the pulley toward the boxing. Many times the end of the key can be taken hold with the claws of a hammer and drawn when the hub of the pulley is tapped lightly. In case the pulley is against the box and the key is cut off even with the hub, it will be necessary to take the shaft out and use a drift from the inside, or if the seat is not long enough to permit this the pulley must be driven on until the key loosens. As soon as the key has loosened and projects a little from the hub a chisel may be used to pull it out, as in most cases it will come easily after being started.



A New Departure in Spring Making

Non-Rusting, Frictionless Springs and Fractures Reduced to a Minimum

J. L. H. Mosier*

Since the invention and application of steel springs—with separate plates or leaves—one of the most annoying and most dangerous factors to contend with has been the formation of rust between the spring plates. Iron and its products are oxides; naturally, when hit by moisture rust sets in. Wet and muddy roads, and washing the vehicle adds to the accumulation and the collection of rust soon hardens and forms an uneven crust, which gives an uneven bearing to the plates—a continuous invitation to fractures.

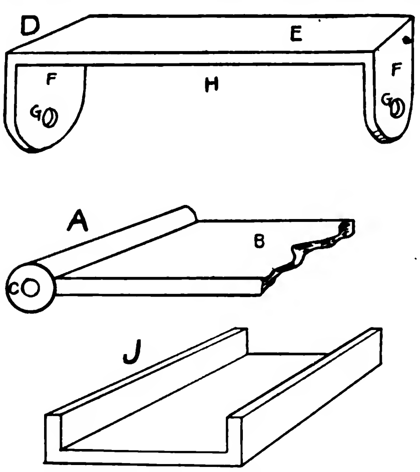
Since the writer has been connected with vehicle building within a fraction of sixty years rust between spring plates of vehicles for pleasure or commerce has been an unwelcome visitor. A foe hated by all who have to do with it. To tell of all the devices and appliances which have been used to kill the mean cuss none have been effective for more than a few weeks at the most. Following the setting forth of a few more mistakes of those who make springs the writer will set forth the merits of his invention free to all who delve in steel to the end that those who use his wares or products may ride with ease.

Formerly the two point-plates were secured at the points by means of a T-head rivet and slot. Then came the bead and open slot at the points of the plates, then follows the blind slot and bead. The latter the bane of all steel springs. The formation of the bead displaces a portion of the metal fiber and opens an opportunity for fracture. The present method of forming the blind slot by means of a saw used on hot metal removes fully 20% of the metal at that point and at once invites fracture. The narrowing of the points of the plates when pointing causes them to disintegrate more or less, and consequently makes them liable to split at the point or wear off at the corners.

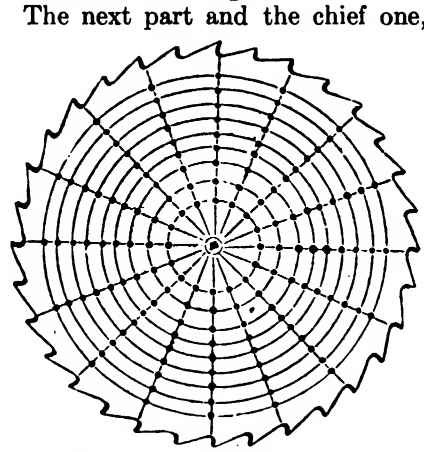
Let us begin at the fount of the mischief. Throw away the beader, slotter and point swage. Instead of swaging the points as soon as they pass through the rolls put them to the trimmers and trim off the extra metal, By this process we reduce the cost materially. After the plates are ready for fitting turn an eye on the end of the second plate and last plate, as at A, B section of plate and C hole or eye for passage of bolt. Next make a clip as at D, E surface bar, FF ears, GG holes for bolts, H recess to permit of placing in the spring. A neat, inexpensive clip to prevent the plates from spreading may be made of malleable iron, as at J. The rubber cushion in which the clip is inserted permits of a gentle yielding at that point of the spring sufficient to take up recoil or submit to extreme pressure and yet keep the plates in position. Do not rivet the clip; allow it to be an active agent.

The next part and the chief one,

*This article is one of several written for The American Blacksmith just previous to Mr Mosier's death. These articles were probably the last of his numerous writings for smith and vehicle journals. The other articles will appear in the near future.



MAKING SPRINGS CORRECTLY


HAMMER AS INDICATED BY THE DOTS

the one which prevents rust and acts as a lubricant to the plates are—ribbons of zinc prepared just as long as each plate and placed between the plates. They will produce a better fit and allow of an easier action throughout. The zinc plates to be made of zinc of from $\frac{1}{20}$ inch to $\frac{1}{40}$ inch in thickness. Other metals—brass, copper, etc.—may be used; zinc, however, is the best. It is probable the pessimist will say, "The plates will make the springs so much thicker"—not enough to be noticed. The reduction in cost of labor will more than pay for the zinc and labor. Buy the zinc in strips or rolls to suit the width of the spring plate. The final result is that mud and water are shut out by the closed joint. The zinc serves the purpose of galvanizing and is even better than galvanizing, as that would soon wear off whereas the zinc plate would always be present.

How to Hammer Circular Saws

The tools required are two straight edges, one from 14 to 18 inches long, and another about 48 inches long; one try-mandrel; one round-face and one cross-face hammer and an anvil.

By placing the straight edge on the saw when laid on the anvil, it can easily be seen if tension is lost. The saw should be tested all around to see if any part between the edge and the center falls away. Such spots should be marked and should not be hammered as much as other parts, if at all. In testing for the tension be sure to have the straight edge crossing the saw diametrically from that point of the saw that rests on the board, the opposite edge being raised by the left hand, while the straight edge is held and gently pressed down with the right hand. Do not lean the straight edge to one side but hold it up straight, or it will fall to the form of the saw and not show what is desired. A straight edge reaching from the center hole well out to the edge of the saw is the best to use in hammering to regulate the tension, and when this straight edge is applied as above the saw should fall away from a straight line; this will show that the center of the saw is stiff.

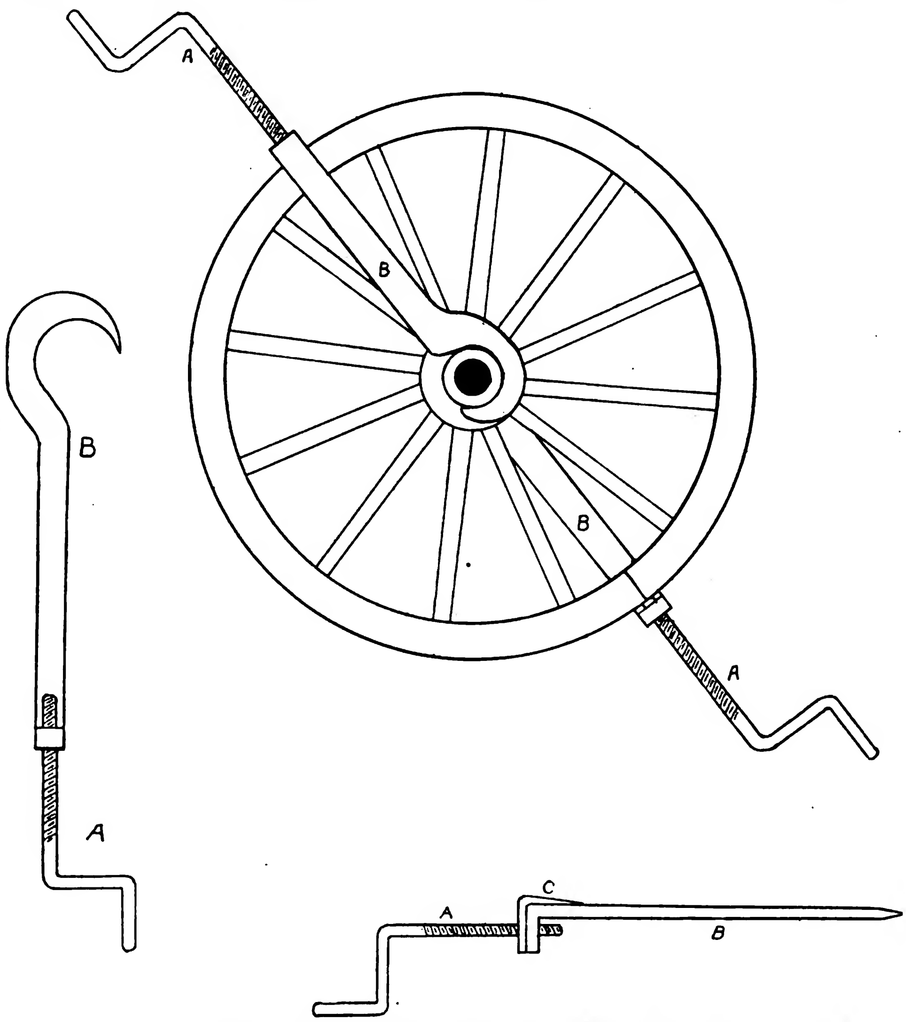
It is very seldom necessary to hammer a saw at the part covered by the collar. When commencing to hammer see that the face of the hammer is ground so that the blow will be round, and do not strike too heavy, for it is better to go over the saw a number of times than to hammer too much at one operation and thus put the saw in worse shape than it was before starting the hammering.

The hammering should occur at the points indicated by the dots in the engraving. After going around on one side mark off the other side and repeat the operation with as nearly as possible the same number and weight of blows as struck on the first side and as directly over them as possible. Now stand the saw on the floor; hold it up straight and test it with the long straight edge. If the hammering has been done alike on both sides the saw will be very nearly true. If, however, it shows full on one side and dishing on the other, mark the places that are full.

Place the saw on the anvil with the round side up; hammer lightly on full places; test again with the long straight edge, and if it appears true put it on the anvil to see if it has the proper tension; if not, repeat the operation with the round-face hammer. When it has been regulated to the proper tension the most difficult part of hammering will have been accomplished.

Next put the saw on the dry mandrel and test it with the short straight edge for running true. Mark the places as they run on or off while turning the saw slowly around. Where the saw runs off the lumps must be taken out with a cross-face hammer and struck in the direction that the straight edge shows the lumps to run. The saw may also be thrown out of true by lumps running toward the center. In this case the saw will be on or off at points about opposite each other. If this part of the hammering is of the proper weight and the face of the hammer properly ground the saw can be made to run true without altering the tension to any extent.

The testing on the mandrel should be with the full side of the saw towards the pointer, and by knocking



A PRACTICAL DEVICE FOR FITTING AND HOLDING RIMS ON BUGGY AND WAGON WHEELS

down the lumps from that side the plate will be made flat. When the saw is fairly flat test it from both sides. Next put the saw on the arbor, and if to be run at high speed it will sway gently from side to side in getting up to full speed and may then run steadily and do its work. If it does not, but rattles in the guides, it needs to be made more open toward the center. An experienced man can stand the saw on the floor and by giving it a sudden shake at the top edge will know it is open toward the center if the center vibrates and the edge stands stiff. If the saw should be buckled by an accident true it with the cross-face hammer before regulating the tension and final truing. Do the same in case of buckling caused by burned spots or sharp limps over the collar line. These may be knocked down by placing two thicknesses of strong, heavy paper on the anvil, when, by a few well-directed blows the limps can be hammered without expanding the metal to the same extent as if straightened on the bare face of the anvil. It is very important to have the blows distributed properly over the surface to be hammered. Hammering too much at one place causes a loose spot or lump that will be difficult to take out. In hammering with the round-face hammer work on lines drawn from the edge toward the center. This will prevent putting twist lumps in the saw and obviate much of the trouble in truing with the cross-face hammer.

If it is necessary to go over the hammering more than once for tension do so on lines between those that have already been operated on. The round-face hammer should have its face so dressed that a light blow would show about one half an inch in diameter; while the cross-face should show a blow three quarters by three eighths inch. A sharp, cutting blow from the hammer is not effective in either knocking down a lump or stretching the metal.

It is always advisable for beginners to start in with a small, circular cross-cut saw, one that can be easily handled, and to practice on this until expert.

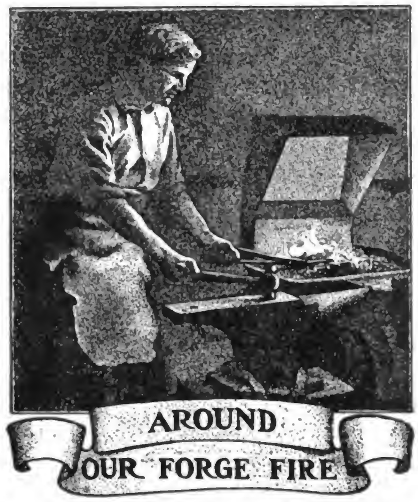
A Practical Device for the Vehicle-Worker

R. T. Dale

The accompanying illustration shows a device for fitting and holding rims on buggy and wagon wheels. For any smith having a considerable quantity of rim fitting to do it would be well to make hooks of both buggy and wagon size. The engraving shows how these tools are made. The hook B is 26 inches long for buggy work and is made of 3/8 by 1-inch flat stock. For wagon work the hook should be 32 inches long and of 1/2 by 1 1/2-inch stock. The hand screw A is 10 inches long, so as to be adjustable for different sized wheels. The method of forming the corner at the hand screw end of the hook is shown at C. Here also is shown how the corner is strengthened or stiffened.

Any blacksmith can make a set of these hooks, and with them the problem of fitting rims becomes easy. Soak the ends of the rims in boiling water, fit to the wheel and after clamping with your hooks allow to set over night.

THIS KENTUCKY SHOP IS WELL EQUIPPED WITH POWER MACHINES



"Courtesy—did you ever stop to consider how much business or the lack of business depends upon courtesy and the lack of courtesy?" and the Editor leaned back in his chair and waited for his visitor to grasp the full meaning of the question.

"Courtesy is a good deal like advertising," resumed the Editor. "You hardly know when it is or isn't going to bring in some business; and, like advertising, courtesy should be practiced at all times. In support of this let me tell you a little incident that changed one firm's attitude toward visitors and callers of all kinds.

"This firm doesn't manufacture rat-traps, but it makes something that is equally usable in every household in the country, and every person is a possible customer—so will say, simply for the sake of clearness, that they make rat-traps. They are comparatively well known, but the attitude of the firm toward visitors and callers of all kinds was that they were a necessary evil and to be gotten rid of as soon as possible. It only occurred to the rat-trap-makers that every caller was a possible prospect after a salesman, bringing an order instead of seeking an order, had been turned down. No one knows how many orders that manufacturer turned away because of lack of courtesy; but they know that their change of policy toward visitors and callers, especially salesmen, has more than repaid them in actual dollars and cents.

"And when I refer to courtesy I don't mean simply answering a man's question politely. I mean treating everyone as a possible customer, whether the person is a chance visitor, a salesman or a real customer; whether you talk face to face, over a phone or by letter; whether the person owes you money or you owe him, and it's good to see the idea of simple tolerance change to the sane policy of treating everyone as a possible customer.

"A courteous letter to a delinquent customer will usually bring the money quicker than a letter full of abuse and then, too, the courteous letter is more likely to hold the man as a customer, while the abusive letter will drive him away.

"There is lots of business lost by the way visitors are received, the way telephones are answered, the way letters are written."

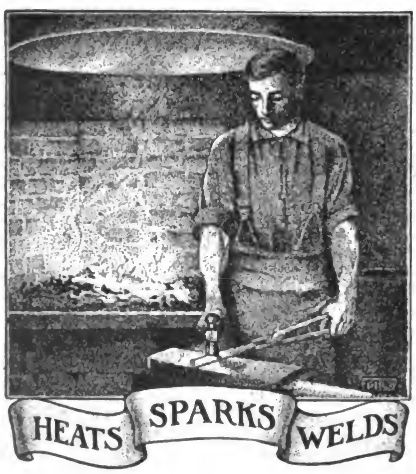
Let Us Smile

Anonymous

The thing that goes the farthest toward
 making life worth while,
That costs the least and does the most, is
 just a pleasant smile.
The smile that bubbles from a heart that
 loves its fellow-men,
Will drive away the cloud of gloom and
 coax the sun again.
It's full of worth and goodness, too, with
 manly kindness blent—
It's worth a million dollars, and doesn't
 cost a cent.

There is no room for sadness when we see
 a cheery smile,
It always has the same good look—it's
 never out of style.
It nerves us on to try again when failure
 makes us blue;
The dimples of encouragement are good
 for me and you.
It pays a higher interest, for it is merely
 lent—
It's worth a million dollars and doesn't
 cost a cent.

A smile comes very easy—you can wrinkle
 up with cheer
A hundred times before you can squeeze
 out a soggy tear.
It ripples out, moreover, to the heart-
 strings that will tug,
And always leaves an echo that is very like
 a hug.
So, smile away. Folks understand what
 by a smile is meant—
It's worth a million dollars and doesn't
 cost a cent.



And—talking of profit—it's possible to make a profit in buying, too.

The smith-shop keeps the smith in about the way the smith keeps shop.

Your outlook for business depends upon how you look out for business.

Make your farmer customers pay up before they put that big fat roll of harvest money in the bank.

True economy is not merely the saving of money—it's the saving of what you get for the money you spend.

There's one thing that keeps success from more men's doors than any one other thing —and that one thing is hard work.

Muscular effort alone is not winning any plums these days. It's the mixing of brain with muscle that pulls down the prizes.

When tempted to slight a job, don't. Do it the best you know how; charge a fair price and keep your conscience clean.

Competition is the life of trade, but when your competitor gets so far ahead of you that you can't see him without field glasses, there's not much competition.

Continued price-cutting cuts your customer's faith in your supposed fair and square dealing. Uphold a fair price and your reputation for square methods.

Don't trust the people you can't trust. Get your money in advance from the doubtful payers and you'll not be working for a dead beat when a good customer wants you.

Don't be afraid to tell a customer he is wrong when he wants something which you know is not the thing he should get. He may not like it at first, but you'll make a friend and he'll like you.

Of course lots of smiths find it necessary to extend credit. But when you give credit do it in a businesslike manner. Don't extend credit as though you were giving out free samples of your work.

Are you using your pink stamps freely? Don't forget them on your letters to jobbers, manufacturers and brother craftsmen. They protect you against loss. A postal will do, if you need some now.

"Yes" or "No"—which is your reply when an autoist asks if you can fix his machine? Lots of "Our Folks" are turning the autoists' misfortunes into money. Are you taking advantage of this opportunity?

Sand is excellent for extinguishing burning gasoline. Why not place a box of it in the engine room? It may some day prevent a serious fire, and it's generally too late to look for it after the fire has started.

Don't be content with just making expenses. If you can't show something on the profit side of the ledger, investigate. There's something wrong, and nothing will discover it quicker than a prying into things generally.

A fifty-dollar kit of tools is worth how much in the hands of a man with but thirty cents worth of knowledge and experience? Is it worth as much as a thirty-cent kit in the hands of a fifty-dollar man? Which would you prefer?

This issue brings Volume Ten to a close. Compare this issue with the first, of ten years ago. Have we progressed? You're getting twenty-six pages now instead of eighteen as years ago, but you're paying the same price today.

The smith who stays in his shop all the time never knows what is going on outside; and then, too, he's very likely to become narrow. Get out once in a while and look about. It'll do you good to see how and what others are doing.

How long are you going to wait before contributing something for publication in the columns of "Our Journal?" There is certainly something interesting you can tell your brother readers. Why not send in an item for the next issue?

The smith who hasn't time to read a craft journal is like the man who hasn't time to care for his health. When a smith thinks his nightly romp with the boys is worth more than a good knowledge of his trade, he'd best quit right away.

You will save time on many occasions if during spare time you will make up some wagon bolsters. They are usually about the same size and shape and, if painted, you will be ready for the hurry-up job when it comes in. B. F. L., Ohio.

Ever think to call up your customers on the phone? Some merchants call up considerable business in this way—no reason why the smith can't do the same. Try it some time when work is slack, see if you can't call up enough jobs to keep you busy.

When a salesman talks in a low whisper and says something about "a little graft on the side" you may be sure there is something wrong with either the salesman or the stuff he's trying to sell. Better take him right up to the door and show him how to open it.

A chap we know says: "Well, y' can't 'spect a feller to work hard ef he don't git the proper kind o' food t' eat." And Mrs. Tardy, his wife, does more work in a day than Tom ever thought of doing in a week. Tom's excuses are just like him—good for nothing.

Once there was a blacksmith who succeeded in business and accumulated an exceedingly large pile of simoleons—and he never read a craft paper. But that was before craft papers were printed and when all a smith needed to know was how to pump a bellows.

Whom do you suppose gets the most out of a craft idea—the man who tucks it away back in the far recesses of his brain or the chap who not only makes use of it himself but gives it to the smithing craft as well? When you've figured it out you'll find there's a moral to this.

You don't expect to heat a piece of steel red hot with a match. Then why expect one advertisement to revolutionize your business? It requires a real fire to heat steel—it requires real advertising to build business. Better not to advertise at all unless you can advertise correctly.

Twenty-four hours a day at the anvil won't teach you all you need know about smithing if you don't use your head correctly and read what others are doing. The formula for success in smithing calls for equal parts of experience, correct reading and brains—mix thoroughly and use freely. Anyone will guarantee the mixture to draw success to your door as a magnet draws steel.

Suppose it were possible for a man to read the world's literature on any chosen subject and then to listen to the world's best lecturers on that subject, what would he gain if he refused to think for himself? You may read THE AMERICAN BLACKSMITH from cover to cover every month, but if you don't think about what you read your time will be wasted. Do you think for yourseld when you read "Our Jolırnal?"

If a stranger gave you a sealed envelope, said it contained a ten-dollar bill, would you hand him the five-dollar bill he asked for? No, of course you wouldn't. You would want to examine the contents of that envelope first. Yet, some men will sign their names to papers without reading them; and often they would get off cheaper by handing a ten-dollar bill right over to the man who asks them to sign. It's not wise to take a stranger's word for fact. Carefully read all papers before signing them and, when the consideration is of any amount, better let your lawyer read them, too.

DOUBLE EXTRA!!

New Rate Added Makes New Leader Easily Possible

To further stimulate interest in our Honor Roll and in fairness to all subscribers we publish a new long-time rate. Several of "Our Folks" have asked for a price on a ten-year term, and when quoting them we thought it only fair and just to announce a ten-year rate, so that anyone can take advantage of it. We therefore take pleasure in announcing a new long-time rate of five dollars for a ten-year subscription. This rate will be added to our regular long-time rates which have been a feature of our subscribers' service since the beginning. And with this new rate it shouldn't be difficult for the leader's name to change.

	U. S. and Mexico	Canada	Other Countries
Two years	$1.60	$2.40	10 shillings.
Three years	2.00	3.40	14 shillings.
Four years	2.50	4.35	18 shillings.
Five years	3.00	4.90	1 pound.
Ten years	5.00	8.30	1 pound 14s

And when you ask a neighbor to subscribe show him this list. A paper with such a list must be valuable and practical.

I. J. Stites, New Jersey........Jan., 1923
R. S. Crisler, Kentucky.......Jan., 1920
T. P. Considine, Massachusetts.Dec., 1918
Richard Brenner, Texas........Feb., 1918
Walker Bros., New Zealand.....Feb., 1917
C. J. Hall, Washington........Dec., 1916
R Sommer, Australia........Sept., 1916
H. M. Larsen, Wisconsin......July, 1916
Geo. P. MacIntyre, Maine....July, 1916
Chester Humbert, Wisconsin..June, 1916
Lincolm Underhill, California..June, 1916
M. Broton, North Dakota......June, 1916
Hans Eriksen, Illinois .... June, 1916
C. Morrell, New Brunswick ... June, 1916
J. O. Conrad, Kansas.......June, 1916
Adam Schmitt, Michigan......June, 1916
C. H. Cairns, New York........May, 1916
P. V. Johnson, Ohio...........May, 1916
F. E. Smith, Vermont........May, 1916
C. A. Stebbins, Kansas........May, 1916
Sanford Baker, Missouri.......May, 1916
D. E. McDonald, Florida......April, 1916
James Baxter, South Africa...April, 1916
E. P. Dignan, South Australia..April, 1916
W. H. Winget, Vermont.......April, 1916
George Howard, Kansas.....March, 1916
G. N. Follmar, Nebraska.....March, 1916
W. Willoughby, Michigan....March, 1916
H. Hoffmeyer, New Jersey....March, 1916
Frank L. Locke, New York...March, 1916
Frank L. Evarts, Connecticut.March, 1916
C. R. Winget, Vermont.....March, 1916
Hugh & John Chisholm, N. Z..March, 1916
C. F. Molkenten, Australia...March, 1916
H. D. Phillips, South Australia March, 1916
E. P. Jones, Kansas...........Feb., 1916
A. Tillman, California.........Feb., 1916
C. K. Cornelison, Pennsylvania.Feb., 1916
M. Klitgord, New York...... Jan., 1916
O. Stenning, South Dakota.......Jan., 1916
Iver Johnson Arms and Cycle Works, Massachusetts.......Jan., 1916
Feldmeyer & Schaake, Kansas..Jan., 1916
Jas. A. Sharp, Massachusetts...Dec., 1915
J. Krahulec, Illinois.......... Dec., 1915
P. E. Dahlfurst, California.... Dec., 1915
Wm. Bisher, Ohio............Dec., 1915
C. A. Jerner, Nebraska.......Dec., 1915
G. S. Fisher, Nebraska........Dec., 1915
Printers Supply Company, Nebraska..................Dec., 1915
M. Kennedy, Tasmania....... Dec., 1915
Williams & Turner, W. Virginia.Dec., 1915
C. J. Ash, Kansas............Dec., 1915
F. H. Joslin, Massachusetts.....Dec., 1915
C. W. Ames, Massachusetts.....Dec., 1915
C. L. Sorensen, Nebraska.......Dec., 1915
E. Williams, New York...... Dec., 1915
W. Urquhart, New Zealand.......Dec., 1915
W. Rupe, Oklahoma.......... Dec., 1915
L. S. Kocher, Iowa.......... Dec., 1915
D. Codere, Illinois............Nov., 1915
F S. Woody, Iowa...........Nov., 1915
George H. Ilsley, Massachusetts.Nov., 1915
M. I. Huff, Missouri.........Nov., 1915
Stephen Wachter, Pennsylvania.Nov., 1915
C. C. Perry, Australia.........Oct., 1915
Sidney Stevens Imp. Co., Utah..Oct., 1915
W. H. Findlay, New Zealand....Oct., 1915
R. F. Watson, California.......Oct., 1915
H. R. Stone, Connecticut......Oct., 1915
F. Teuber, Georgia........... Oct., 1915
Ed. Hammill, California.......Sept., 1915
R. D. Simkins, Pennsylvania...Sept., 1915
T. J. Reynolds, Pennsylvania..Sept., 1915
Wm. Bates, Texas............Sept., 1915
J. Knight, England...........Sept., 1915
L. F. Kuhn, Mexico.........Sept., 1915
A. Chargois, Queensland, Aus...Aug., 1915
A. M. Byfield, West Australia...Aug., 1915
C. E. Allen, Nebraska.........Aug., 1915
M. J. Roder, Montana.........Aug., 1915
J. E. Lyon, Texas.............Aug., 1915
F. W. Krenz, California.......Aug., 1915
Jos. P. Rotolinski, Massachusetts.Aug., 1915
Jas. A. Buchner, Michigan..... July, 1915
G. N. Ferree, Utah........... July, 1915
T. O. Chittenden, New Zealand.. July, 1915
The Goldfields Diamond Drilling Company, Australia.........July, 1915
J. A. Lawton & Sons, South Australia .... July, 1915
I. Murray, South Australia.... July, 1915
J. W. Ivil, Utah............. June, 1915
E. L. Herving, Florida......... June, 1915
G. R. Twedell, Mississippi.....June, 1915
Van den Wildenberg Brothers, Wisconsin .... March, 1915
V. Priessnitz, Wisconsin......March, 1915
F. J. Ties, Wisconsin.........March, 1915
J. Marshall, Indiana.........March, 1915
H. D. King, New Jersey......March, 1915
W. E. Bedford, North West Territory .... March, 1915

Ten Questions for the Month

Under this heading we will each month endeavor to print ten questions on some one branch of general blacksmith work. These questions will be such as are best calculated to bring out a smith's knowledge or lack of knowledge on the subject covered. This month's questions are on forging and forging operations. The answers will appear in the next issue.

1. How should steel be heated for forging?
2. What are the results of heating too quickly? Too slowly?
3. If steel is heated too hot, partially cooled and then forged, what is the result?
4. Why is a flux used in welding? Name three common fluxes.
5. What is the effect of light blows on heavy stock?
6. In scarfing, preparatory to welding, why should the scarfs be convex rather than concave?
7. How may burnt steel be restored?
8. What is tool-steel?
9. What is the effect of heating steel red-hot and suddenly cooling it? Of heating it red-hot and cooling it slowly?
10. How do wrought iron and machine steel differ? How are they alike?

Discussion on these questions is invited. Any reader desiring to send in replies to these questions is invited to do so. It is suggested that all readers write out their answers to the above, not necessarily for publication, but so as to get a more vivid idea of what they do or do not know.

How to Weld Axles

R. A. McGill

One of the brother smiths wants someone to advise him how to make axles stick when welded so they won't break off. I think I understand welding axles and also think I know his trouble. He gets his axles too hot, and he uses too much sand and borax, or too much compound. When using compound in making a weld you are working against yourself, for it makes a scale on your iron and you can't break it off. I can't find anything that a compound is good for except for some man to sell to make an easy living on. I bought a package of welding compound once in my life and paid thirty-five cents for it and tried it on a weld. After I made the weld I threw the compound away. I found that it was only to sell—not to use. It will sell, but it is no good. It lacks the right kind of heat to make a weld. To make a good weld does not require sand or borax or any compound. I don't use sand, borax or a compound in making a weld. When I weld axles I first scarf them with as short a scarf as I can make. I upset it instead of drawing it out, so as to make the scarf larger than any other place. When I have it scarfed to suit me I take my hot chisel and cut a gash across the top about a half inch below the heel of each

piece, which prevents them from slipping apart. When I lap them together it forms a lock. I heat them to a bright heat, lap them together and weld down the lip on the top side. I don't draw it any—just so it is welded down. I then take another good, greasy heat and weld down the other lip; but I don't use any sand, borax or anything else but good coal and a clean fire. When I get both lips welded down, I take another good, greasy heat and dress it up, but I don't let it sparkle and I don't let it come to a white heat, for if it begins to sparkle it is too hot, and if it comes to a white heat it is too hot. It will weld all right with a white heat and with a sparkle heat, but it will break. In using sand or borax or any other compound, when sticking the two pieces together a scale will be left in the weld, and after it is used for a while it will come apart.

I do all of my own work; I have no helpers. I can put a set of stubs on a buggy or wagon, size up to 1¼ inch in a half day, putting in the boxes and having the buggy or the wagon ready for the owner in that length of time. I get 50 cents a weld, so I get $2.00 for the set and 25 cents a box, so it nets me for the job $3.00. I hope my way and plan will be of some use to our Brother. I want him to try my way and let me hear from him.

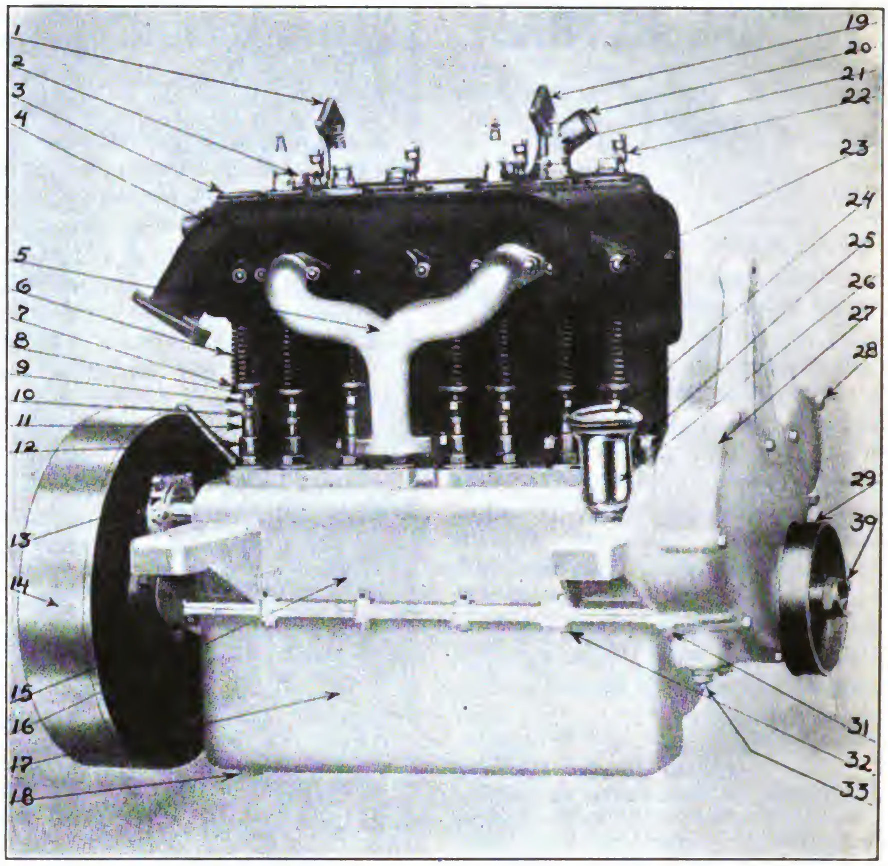
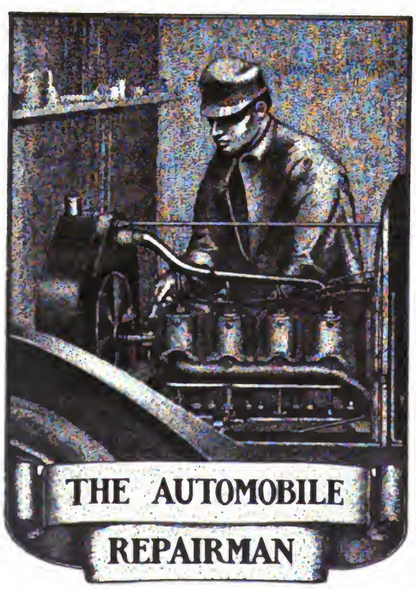


FIG. 1—RIGHT SIDE OF MOTOR

1—Spark coil support.
2—Water jacket cover stud.
3—Valve cover plug.
4—Exhaust header.
5—Intake header.
6—Valve spring.
7—Valve spring seat.
8—Valve.
9—Push rod adjusting screw.
10—Adjusting screw lock nut.
11—Push rod.
12—Push rod guide.
13—Timer.
14—Fly wheel.
15—Nut.
16—Crank case.
17—Lower half of crank case.
18—Pipe plug.
19—Spark plug cable support.
20—Water jacket cover.
21—Spark plug.
22—Water jacket cover stud.
23—Header bolt.
24—Vent tube cap.
25—Crank case to cylinder stud.
26—Vent tube.
27—Gear cover.
28—Nut.
29—Fan drive pulley.
30—Crank shaft jaw.
31—Crank case flange stud.
32—Nut.
33—Front bearing stud.



The Parts of an Automobile Motor

The several engravings show: Fig. 1, the right side of the motor of a Hudson car; Fig. 2, the parts of the motor before assembling; Fig. 3, the left side, and the numbers in each engraving refer to corresponding numbers under each picture, giving the correct name of each part. These engravings should be of considerable value to readers and enable them to get a still better idea of the parts and names of parts making up a complete motor.

Succeeding issues will contain similar engravings of the clutch and transmission, front axle and steering connections, roller bearing rear axle, plain bearing rear axle, carburetor and parts and the timer and parts.

A Number of Practical Hints for the Auto Repairman

J. W. Bagley

After a motor car has been run for some little time the steering gear seems to be loose and does not respond to the turn of the wheel as it should. Much of this is laid to the inside workings of the gears when the pins in the joints are at fault. As there are no means of adjusting these joints it is necessary to remove the pins and replace with new. In case the eye is worn oval it will not remedy the cause entirely and a reamer, or a drill, must be run through the holes and the pin turned to fit. Fig. 1 at D, while somewhat exaggerated, will show plainly the shape of a worn pin. After drilling the eye, say a $\frac{1}{32}$ of an inch larger, and turning the pin to fit, the pin should be casehardened if made of soft steel, while if made of tool steel it may be hardened in the usual manner.

To caseharden the pin heat it to a bright red and remove from the fire and sprinkle a little prussiate of potash over the surface to be

hardened and place back in the fire until the potash has melted and flowed over the surface. It may then be dipped in clear, cold water as in hardening tool steel. This gives the outer surface of the pin a smooth, hard finish while the inside is soft and tough. For this reason many prefer the casehardened pin to the one made of tool steel.

Much care should be exercised in drilling the holes that the drill follows the old hole exactly, so that if possible the rods and jaws should be drilled together while in place. In making this little pin one must remember to drill the small hole for the key at the bottom end before hardening, or if it is to be threaded this should be done before hardening, as it will be impossible to drill or thread the pin after it has been casehardened. If these little pins are subject to wearing uncommonly fast a small oil hole may be drilled into the top of the head C, leading out about the center of the pin in such position that it will lubricate the parts A and B. Before placing the pin and fastening it care should be taken that the parts

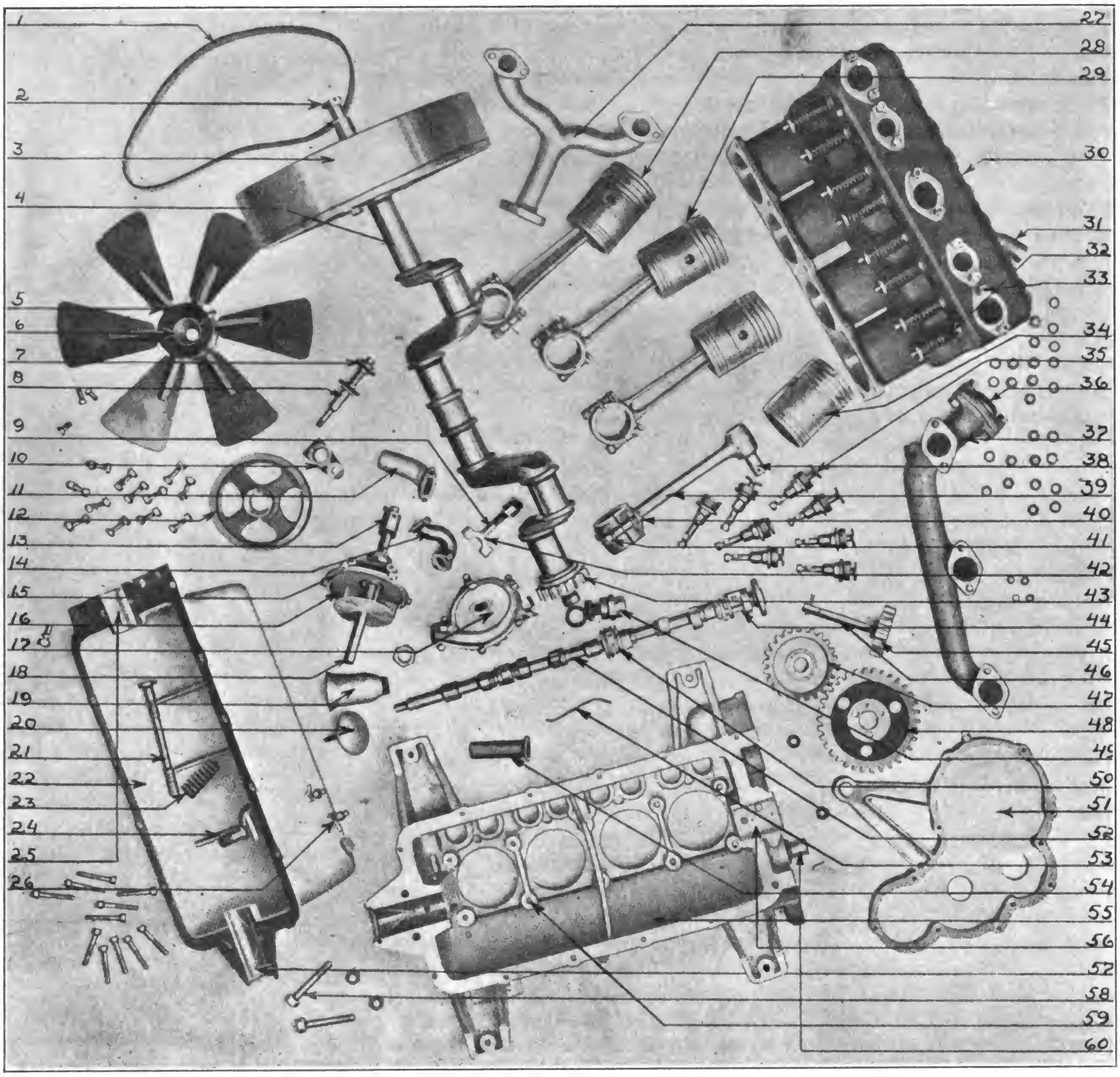


FIG. 2—MOTOR PARTS BEFORE ASSEMBLING.

1—Fan belt.
2—Crank shaft nut.
3—Fly wheel.
4—Crank shaft.
5—Fan blade.
6—Fan hub.
7—Fan bearing cone.
8—Fan spindle.
9—Grease cup extension.
10—Fan support arm.
11—Water inlet.
12—Fan drive pulley.
13—Pump shaft coupling.
14—Water inlet elbow.
15—Pump body.
16—Water wheel.
17—Pump body.
18—Water wheel shaft.
19—Vent tube.
20—Vent tube cap.
21—Oil pump piston.
22—Lower half of crank case.
23—Oil pump spring.
24—Oil pump cylinder.
25—Crank shaft bearing.
26—Oil drain cock.
27—Intake header.
28—Piston and parts.
29—Piston ring.
30—Cylinders.
31—Water jacket cover.
32—Valve spring.
33—Header bolt.
34—Piston.
35—Valve push rod.
36—Exhaust pipe flange.
37—Exhaust header.
38—Piston pin.
39—Connecting rod.
40—Connecting rod bolt.
41—Nut.
42—Pump body clamp.
43—Crank shaft bearing.
44—Cam shaft bearing.
45—Motor water pump gear
46—Pump gear shaft.
47—Motor idler gear.
48—Cam shaft gear.
49—Crank shaft jaw.
50—Cam shaft center bearing.
51—Gear cover.
52—Cam shaft.
53—Fly wheel pointer.
54—Oil pump strainer.
55—Crank case.
56—Crank shaft bearing.
57—Crank shaft bearing.
58—Bolt.
59—Crank case to cylinder stud.
60—Motor idler gear bearing.

A and B are not in a twist and that they go together freely. The pin should be made the exact length, so that after the locking device at the bottom is placed it will not move up and down.

A clamp for a broken spring is a very handy thing and consists of a pair of clamps and pieces of either wood or metal to clamp to either side of the spring. A piece of an old spring makes a very nice lap for splicing. The lap should have a slight curve to it, as shown at A, Fig. 2.

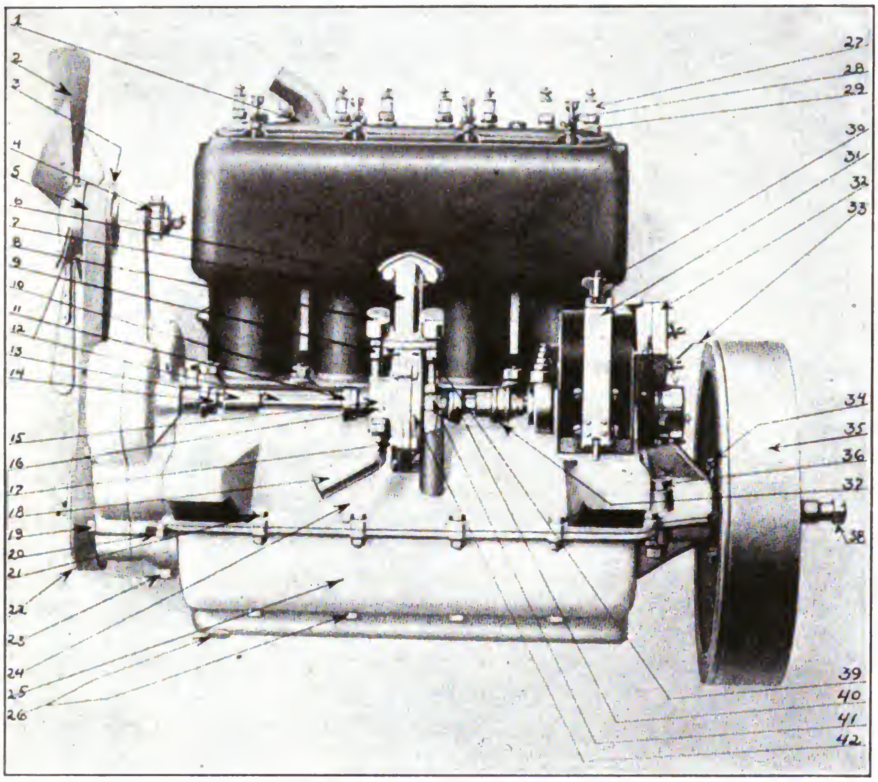


FIG. 3—LEFT SIDE OF MOTOR

1—Water jacket.
2—Fan blade.
3—Fan hub.
4—Fan support arm.
5—Fan belt.
6—Nut.
7—Water inlet elbow.
8—Grease cup.
9—Grease cup extension.
10—Crank case to cylinder stud.
11—Front packing nut.
12—Pump gear shaft.
13—Pump shaft coupling.
14—Water pump shaft bearing.
15—Pump body, front half.
16—Nut.
17—Bolt.
18—Water inlet to pump.
19—Nut.
20—Nut.
21—Bolt.
22—Fan driver pulley.
23—Nut.
24—Crank case.
25—Lower half of crank case.
26—Pipe plug.
27—Spark plug.
28—Priming cock.
29—Water jacket stud.
30—Thumb nut.
31—Magneto strap.
32—Bosch Magneto.
33—Fly wheel pointer.
34—Nut.
35—Fly wheel.
36—Nut.
37—Magneto coupling center.
38—Crank shaft nut.
39—Grease cup extension.
40—Rear packing nut.
41—Pump body clamp.
42—Pump body, rear half.

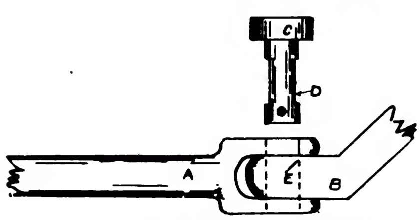


FIG. 1—WHEN THE STEERING MECHANISM IS LOOSE

At D is shown a clamp in detail. The clamps should be made a little longer than will be required when the lap is drawn tight to the broken spring.

When making the clamps one may have difficulty in getting them bent or spaced just right, and for this reason it is advisable to measure them and mark with a prick punch where the bend is to be. One must not forget that the threads must be made on the red before the clamp is bent or he will have trouble. If these clamps are to be enameled or painted it must be with paint that will dry quickly. Slow-drying paint will gather the dust and look as bad as the bare metal. Just before giving the clamps a coat of enamel it is well to take a small blow torch and slightly warm the parts to be painted. The enamel may now be applied, and

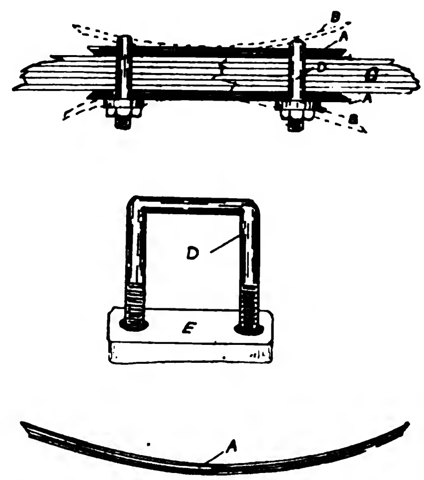


FIG. 2—AUTOMOBILE SPRINGS SOMETIMES BREAK

in a few minutes the car may be taken out.

The repair man is frequently called upon to repair a cracked water jacket. There are many ways of doing this job satisfactorily; of course, we understand that brazing or welding is the only correct way, but the repair man may make many different repairs that will give the owner good service. One of the methods used is as follows:

The first thing to do in making a repair of this kind is to trace the crack to its extreme end and drill a small hole to keep it from cracking farther. A patch should be cut wide enough to give a good fastening for the screws on either side. Holes should be drilled about one inch apart and tapped for a small screw. The patch may be made of sheet metal of any kind, but sheet brass will work well and give good results. With a small hammer the patch must be bent to shape before trying to screw it down.

Mix a small quantity of litherage and glycerine to a thick paste and work it well into the crack and leave a small coat under the patch. Screw the patch down and the repair is made. It would not be advisable to turn the water into it before warming it up, either with a torch or by running the engine a while before placing the water into the jacket. If the

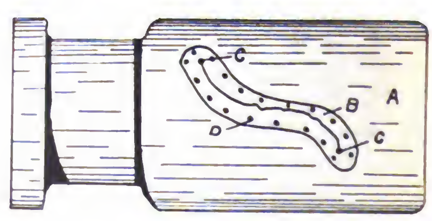
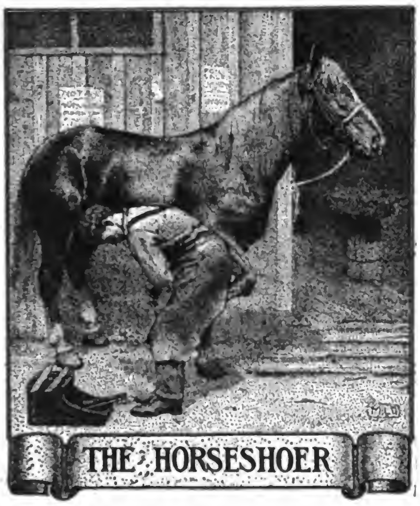


FIG. 3—A CRACKED WATER JACKET IS NOT AN EXCEPTIONAL ACCIDENT

cracked cylinder is from a stationary engine it may be repaired with the litherage and glycerine without the patch.

Litherage and glycerine will also be found very valuable in putting crank cases and such parts together, but in each case it will require some little time to set. Oil will not affect this mixture after it has set. If it is used for packing in the crank case many times the case may be removed and replaced without disturbing the packing.



A New Shoeing Record

Last month we told about Mr. L. E. Layne, of Santa Anna, Texas, who claimed the world's shoeing record, having shod a horse all-around, using seven nails to a shoe, in the remarkable time of five minutes and twelve seconds.

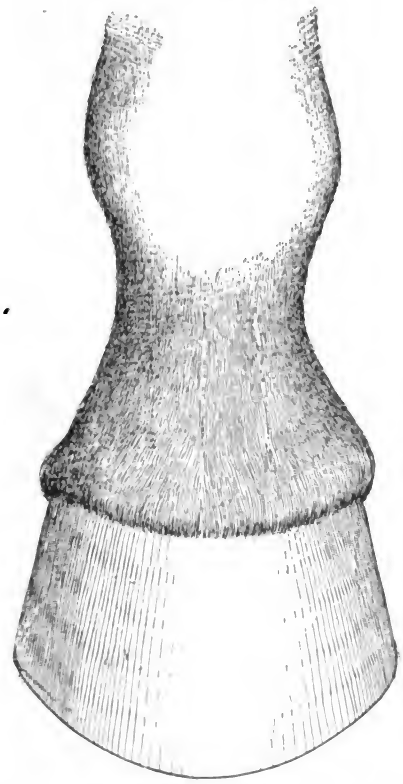


FIG. 1—LOOKING AT THE FOOT FROM IN FRONT

This feat has since been beaten considerable by James E. Briggs, of Childress, Texas, at the Thrasher Blacksmith Shop, where he is employed. Mr. Briggs claims to be an expert shoer, and in the contest for speed Tuesday he shod one horse, all-around, seven nails to the shoe, in four minutes and thirty-two seconds. The second horse was shod in the same manner as the first, but four minutes and fifty-one and two fifths seconds were consumed before the job was completed. In this job Mr. Briggs failed to drive a nail straight and in removing the shoe and nail lost nearly thirty seconds. He feels confident that he can lower his own record by several seconds. No one assisted Mr. Briggs in any way.

Mr. Briggs now claims the world's shoeing championship.

Shoeing the Horse Correctly—3

J. C. Weaver

Preparation of the Foot

How often we hear, "Fit the shoe to the foot!" But that is merely half the truth. Suppose, for instance, that you remove the old shoe from a horse's foot and fit a new shoe directly to that foot without alteration—how long do you think that horse would travel correctly? The foot and shoe must be fitted to each other. The shoe can be correctly fitted to the foot only after the foot has been properly prepared, and the proper preparation of the foot is what we want to consider now.

As a rule when a horse comes to the shoer to be shod, the feet are overgrown and not correctly proportioned. If the shoe has been thrown the chances are that the hoof will be more or less broken and a deficiency in horn will be apparent in places. The object in both cases is to so alter the shoe-bearing surface of the hoof as to obtain the best bearing.

The general principle or rule for the preparation of the hoof is to remove the superfluous horn in such a way so as to bring all parts of the hoof into equal use or bearing. A good, healthy, well formed hoof so prepared will conform to the following points: When viewed from in

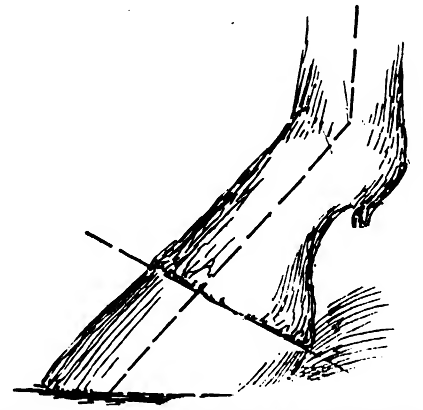


FIG. 1—THESE IMAGINARY LINES TELL THE SHOER MUCH

front the wall will be the same height on both sides, and an imaginary line drawn down the center of the leg will cut the hoof exactly in two equal parts. When looked at from the side the height of the heel and toe will be proportioned, and the axis of the hoof will be in direct line with the axis of the pastern. When viewed from behind, the correctly trimmed foot will show the frog touching the ground, and upon lifting the foot the bearing surface of the wall will appear level, the sole will be concave and have a rough appearance. Reference to the engravings, Fig. 1, will illustrate these several points.

Naturally, the conditions described being ideal, are unobtainable in all cases, but it behooves the wise

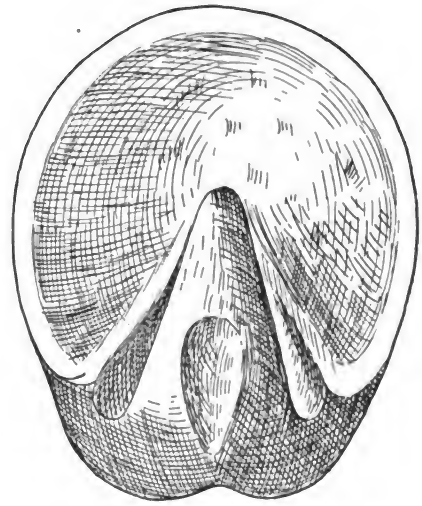


FIG. 1—THE BEARING SURFACE SHOULD BE LEVEL

shoer to get as close to these conditions as possible.

Now let us take a few common examples of incorrectly shaped feet and prepare them for the shoe. In Fig. 2, at A, is shown a foot with a disproportionately long toe. It will

be noted by the dotted lines that the axis of the foot and pastern are not in line; nor does the shortening of the toe, as at B, correct the axis of the foot. The correct method of trimming this foot is by paring the horn, as shown by the line X. This will drop the toe down, raise the point where hoof and pastern axis meet and restore the correct axis, as in C.

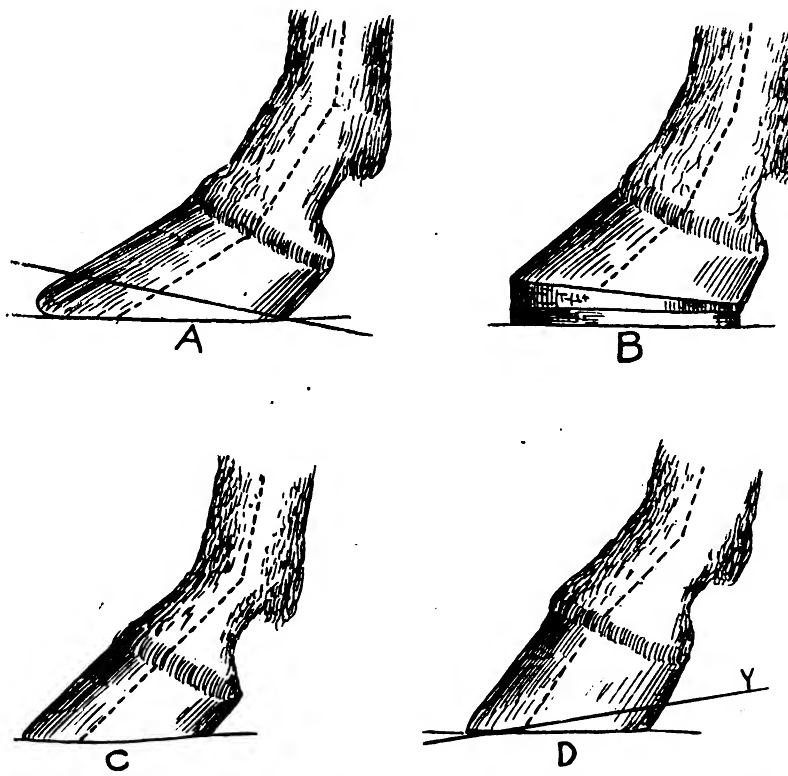


FIG. 2—SOME INCORRECTLY SHAPED FEET AND HOW TO CORRECT THEIR FAULTS

At D in Fig. 2 the heel of the foot is too long. The correct method of restoring the axis of the foot in this case is to pare the foot, as shown by the line Y. This drops the center of the axis and restores the balance of the foot.

Most shoers seem to think that these alterations on the hoof effect the appearance of the foot only. The appearance of the foot, while it should be given some consideration, is not by any means the most important. The relation of the foot and limb are the important considerations. It must be very evident that any alterations of the foot must effect the limb with its net work of muscles and ligaments. Any alterations of this kind will not greatly effect the action of the limb if such alterations are but temporary. But should such disproportion continue for any length of time the unavoidable alterations in the action, in the relative position of foot and limb and the changed position of bones, ligaments and muscles will tend to become permanent and may do a great deal of harm. And this harm, because of the effect being so slow and gradual, is not readily traced to its true cause. Therefore, the sooner the shoer realizes the importance of maintaining the correct proportion of the horse's feet, the sooner will he become efficient in the preparation of the feet.

And while on this subject of foot preparation, it may be of some assistance to the reader to know the correct angle of the foot. The engraving, Fig. 3, shows how the angle of the hoof wall may be obtained, and it also shows the correct angles for the hind and also the front foot. It is, of course, impossible to pare all feet to conform to these angles, but the shoer must use his head when he comes across a case where the angles of the feet are different or where he is led to believe that the natural foot is pitched either more or less than in the engraving. The safest rule to follow is to make the axis of the foot a continuation of the axis of the pastern. This will, in the majority of cases, insure the correct balance and proportion of the foot and limb.

While nothing has so far been said concerning the shoe, it is of course necessary that the style and kind of shoe be taken into consideration when preparing the foot. For example, suppose we have prepared the foot properly, have leveled the ground surface, have corrected the angle of the foot and are now ready to fit the shoe. We have pared the hoof without consideration of the shoe. Now we attach a shoe with heel calks, but no toe calk—the result is a high heel and a foot in practically the position as shown at D in Fig. 2. So it is absolutely necessary to consider style and kind of shoe when preparing the foot for shoeing. When ready for the shoe each hoof should be let down with the shoe held on it and a careful examination made of from the sides and from in front and behind before being finally attached.

A Few Practical Hints and Receipts for the Horseshoer

J. B. Wallace

There are a number of receipts for protecting a horse from flies, but here are two simple ones that anyone, no matter where located, can apply: The first is common kerosene oil. Simply dampen the hair with the oil. The other preparation consists of a handful of bay leaves boiled for five minutes in two pounds of lard. This mixture when cold is applied to the hair and will keep the flies away effectively.

A very good remedy for nail wounds is made by placing one gill of sulphur-napthol in one gallon of water. Use this solution freely after washing out the wound as well as possible. This same solution is also excellent for scratches.

A very excellent salve for horses is made by rubbing one ounce of zinc oxide into eight ounces of mutton tallow. Rub the two ingredients together well and use wherever

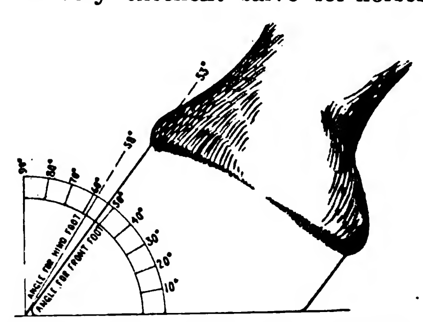


FIG. 3—HOW TO FIND THE CORRECT ANGLE OF THE HOOF

and whenever a good salve is needed. If preferred, vaseline may be substituted for mutton tallow.

Harness galls may be quickly healed by sprinkling with air-slacked lime. Proper care will prevent their recurrence.

Some Recent Drilling Records

At the recent joint Conventions of the Railway Master Mechanics and Master Car Builders Associations held at Atlantic City, June 14th-21st, 1911, great interest was aroused by some phenomenal results obtained in a demonstration test of twist drills. As the durability and efficiency of tools are such important factors in economical production, these results should be welcomed by all interested in this subject.

The Cleveland Twist Drill Co. of Cleveland had a Foote-Burt No 25½ high duty drill press in operation in connection with their exhibit and the results obtained from tests of Cleveland milled and flat wist drills taken from stock are as tabulated.

The first tests were made for the purpose of demonstrating what is good shop practice, i. e., the drills were put through at speeds and feeds that would be economical under average shop conditions. Then several "stunts" which demanded extremely high rates of speed and feed were attempted.

The highest rate of speed in drilling known to machine shop practice was attained by a 1¼-inch Paragon Flatwist High Speed Drill in removing 70.55 cu. in. of cast iron in one minute, repeatedly cutting through a heavy billet at the record-breaking rate of 57½ inches per minute or nearly an inch per second. This drill ran at 575 revolutions per minute with 1/10 (.100) inches feed per revolution. Before attaining this maximum performance which was approached gradually, numerous other drills were put through at the rates of 25, 32½, 33½, 35 and 47½ inches per minute, as can be seen from the complete record of the tests. In no case was the limit of strength of the drills reached, but the speed of 57½ inches per minute could not be exceeded on account of the inadequate capacity of the electric feed wires which brought current to the motor driving the drill press.

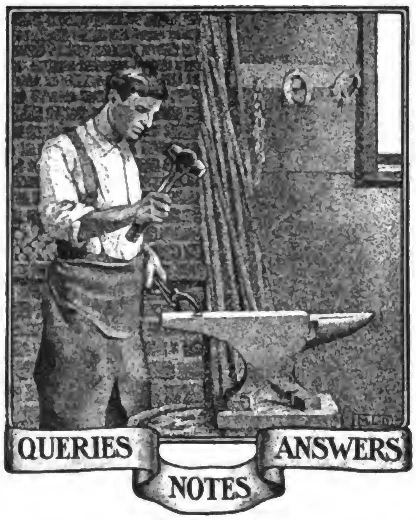
Drilling at such high speeds and heavy feeds is not to be recommended as economical shop practice, and this performance will in all probability not be repeated in many shops. These results were only made possible by carefully established ideal conditions, such as:—absolute rigidity in the machine, uniform and sufficient driving power, solid clamping of the work, perfect grinding of the tool and most expert handling. They are of value chiefly as demonstrating the power and rigidity of the machine and the exceptional strength of the drills.

Another noteworthy test was made with a 2½-inch milled drill from stock. It drilled 68 holes through a billet of machinery steel 4¼ inches thick, without being reground. This drill was operated at 150 revolutions per minute with a feed of .015 per revolution removing a total of 1418 cu. in. of material. Although the drill was still in good condition the test was cut short at this point by the convention coming to a close. This test demonstrated what can be done all day long in any shop properly equipped and is indicative of what results should be expected in economical High Speed Drilling.

Size and Kind of Drill	Material	R. P. M.	Feed per Revolution	Inches Drilled per Minute	Peripheral Speed in Feet per Minute	Cubic Inches Metal Removed per Minute
1¼" Paragon	Cast Iron 3½" thick	500	.050	25	163.6	30.68
1¼" "		325	.100	32½	106	39.88
1¼" "		475	.100	47½	155	58.29
*1¼" "		575	.100	57½	188	70.56*
1½" "		300	.030	9	117	15.90
1½" "		325	.100	32½	127.6	57.43
1½" "		335	.100	33½	131.5	59.19
1½" "		355	.100	35½	139.4	62.73
1¾" "		235	.100	23½	107.6	56.52
1¾" "		350	.100	35	160	84.19
2 5/16" "		190	.050	9½	115	39.90
3" "		120	.100	12	94	84.82
1¼" "	Mach. Steel 4¼" thick	350	.030	10½	113.7	12.88
1⅝" "		225	.040	9	94.8	18.66
2 5/16" "		165	.020	3¼	100	13.65
2 5/16" "		200	.020	4	121	16.80
2½" Milled		150	.015	2¼	98	11.04
2½" "		150	.040	6	98	29.45
2½" "		175	.040	7	114.5	34.36
1¾" Paragon		275	.030	8¼	125	19.84
3" "		150	.030	4½	117.8	31.81
3¼" "		150	.030	4½	127	37.33

*This is the highest drilling speed on record.

COMPLETE RECORD OF THE TESTS



On Knowledge and Axle Welding.—I have been thinking of writing to The American Blacksmith ever since I first took the paper, but can't think of anything to write, as everything I know has been told, and a lot that I did not know. I am now sixty years old, but when I was about twenty-five or thirty years old I could have told the world how to do anything; now I am old enough to know that I don't know anything of importance.

I have worked at the trade all of my life and think that the members of the craft ought to have a brotherly love for each other. I think also that it is a disgrace to the profession to cut prices; I have never favored that. The best thing for us to study is how to get paid for what we make. We are all done out of a great deal of our work and this is what hurts the craft more than anything else. The next thing is excessive drinking.

Brother S. A. E. is right on painting bare rims and Brother Peter Peterson is sound, also J. D. Ferrell and a great many others too numerous to mention. We ought not to throw stones at our young craftsmen, for we passed over the same road. I would be at a loss myself if I knew it all and if I could not do the second job better than the first.

In answer to Mr. D. Davies, of South Australia, I think the cause is his coal or a filthy fire, or perhaps it lies with the smiths. He says at times he employs fifty smiths, and a smith must be honest to do good work. The axle welds that break are burnt and those that come apart never were welded. This trouble could be caused by a little carelessness or a small cinder on the scarf. When anything comes back to me to be done over I know at a glance what the cause is. J. T. Tippett, Texas.

About Forge Fires.—In a recent issue Brothers Yost and Halverson ask several questions about forge fires and which style of fire is the best. This little talk on forge fires will no doubt give them the information they are seeking.

To burn coal properly we must have oxygen, and in the forge this oxygen is supplied by the blower which blows air into the fire. If too much blast is used the oxygen is not all burnt out of the air and the unburned oxygen then affects the heated iron, causing a scale or oxide to form on the iron. The ideal condition is, of course, to blow just enough air into the fire to make it burn properly and to burn all of the oxygen out of the air. Now, this ideal is, of course, difficult to obtain, and the very best we can do is to make conditions such as will come as close as possible to a realization of the most favorable results. It goes without saying that a shallow fire has not as much opportunity for burning all of the oxygen out of the blast as a deep fire, and it is therefore apparent that a deep fire is less likely to be an oxidizing fire than is the shallow fire.

From the standpoint of cheapness or economy as far as coal is concerned the deep fire will no doubt consume more coal than the shallow fire, but from the viewpoint of best work and economy of stock the deep fire will prove best, and the small amount of coal more required to run the deep fire will more than be repaid in better work and easier welds. L. M. R., New York.

A Novel Smith-Shop Sign.—One of the brothers was asking for a good blacksmith sign. I will try to describe one that I made myself and it attracts more attention than any sign I ever saw.

First, take a board of some tough material, ½ inch thick, 6 inches wide and 12 inches in length, and two pieces of iron, 4 inches by 1 inch, ⅛ inch in thickness. Bend the straps in the center and drill two holes in one end of each for 5/16-inch bolts, and then drill a ⅜-inch hole ½ inch from the other end. Bolt one piece on the board ½ inch from one end and bolt the other 6 inches back. Take a ⅜-inch rod 7½ inches long and run threads 2 inches from each end. Put double nuts on one end, put rod through holes in the straps and adjust the rod so you will have ½ inch behind the back strap. Now cut four pieces of heavy tin in a fan-shape, 6 inches long, 4 inches wide at wide end and take two strips of iron ¼ by ½ by 14 inches. Fasten the tin on each end and drill a hole ⅜ inch in center of strip. Twist the ends of the strips and cross them to make a wind-mill and fasten with double nuts on outer end of rod. On the back end fasten a tail of tin, 12 inches long and 6 inches wide. Now, get a piece of cedar, or some good soft wood, and carve a figure of a man on the back of it. On the right side cut a groove ½ inch wide and ½ inch deep from shoulder to leg. Fasten the arm on with a rivet so it will work freely. Let it extend back of the rivet ½ inch and drill a hole in it. Fasten a wire in this hole, letting it pass down the groove in the back. Now fasten the man on the board on the side opposite the rod, so that wire will come directly over back end of rod. Have end of rod flattened and bend square. Drill ½-inch hole in rod and fasten rivet in it so as to make a crank pin, pin to be ⅛ inch from center, and connect wire so that when fan turns rod it will cause man to use his arm. Fasten a small anvil in front of the man, place a hammer in his

right hand and put something in his left hand for him to hammer on. Take a block of hard wood, 2 by 2 by 3 inches, bore a ⅝-inch hole in end 2 inches deep. Take ⅝-inch hole in rod, dress one smooth and round, set straight in hole and babbitt around it. Fasten block on bottom of board, so it will balance; flatten other end of rod, punch holes, bolt to upright, set board on upright and place in the wind. Dress man up, paint his face, and paint on notice "Village Blacksmith—he works fine."

E. N. Griffin, Kansas.

Practical Pointers on Stone Tools.—As I am a new subscriber and this is my first offering I hope it will receive attention and also help those who desire the information.

Brother Miller asks advice on stone hammers and I think I can help him as I have handled all kinds in this rocky New England country for fifteen years. To handle steel and get results the first thing is the heating which a man used to handling iron is apt to be too generous with. I heat the face end of the hammer slowly to a little better than a cherry red heat and upset it well with the ball-peen of my hammer, then draw the edges down to and a little under the sides of the hammer leaving the face a little hollowing as in the engraving. Then draw peen down rounding slowly until sharp and file straight but not too sharp.

Then reheat the face to cherry red and dip in the tub deep enough to cover the eye and let cool until water will stay on the face. Then heat peen an even cherry red and cool so there is heat enough to start the temper slowly to a straw color, then cool enough to stop temper from running and let it finish cooling in the air which I find toughens them considerably.

In the engraving I show a sketch of a hammer shaped to stand the abuse that paving cutters and stone masons usually give them. I also show a sketch of one of many I have seen and re-sharpened that are more apt to clip and break than stand and as we call it here "they have wings on them."

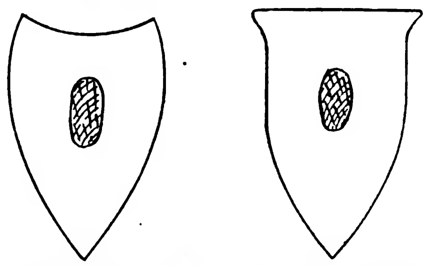
I get 40 cents for sharpening one of these hammers, 20 cents for the face and 15 cents for the peen and 50 cents for double-faced ones which are very few in masons' kits but very plentiful in the paving cutters' outfit. I will say in closing that the shaping of the face of these tools is the largest feature in the standing qualities outside of the heating.

Now a word for Brother Gore on new laying picks. We have a regular pick steel rolled especially for that purpose, a low carbon steel that welds very nicely and perhaps your jobber can furnish you if you call for it. To new lay a pick cut off the end and upset by putting handle in the eye and striking hot end on the anvil a few times, then split and scarf both sides. You can work your steel at the same time and draw steel wedge shape. Then back it with the corner of chisel so it will give you a little spur to hold it in place while you get your heat. When you place your steel between the scarf of pick have it quite cold, say black heat, close your scarf over steel and weld. You can use borax or any compound you wish but the pick steel I speak of welds nicely with sand. After you have drawn and sharpened the pick take a cherry red heat and run slowly to almost a blue on the joint.

I hope that this will help the brothers and give them the desired information.

A. H. Brown, Maine.

On Shoeing and on Laying Out Hounds.—In reply to the brother in the May number who asked about shoeing a forger, I take the front feet and trim off the toe short. Take a shoe that weighs from sixteen to eighteen ounces and cut off the toe square as at A in the engraving. Then trim the hind feet just opposite to the way the front feet were trimmed. Cut the heels down low, but not so low as to injure the tendons of the back of the leg. Shoe the hind feet with a very light shoe with toe and heel calks, making the heel calks a little bit lower than the toe calks. I have shod horses this

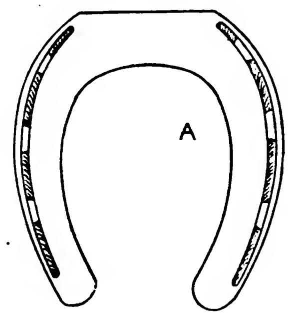


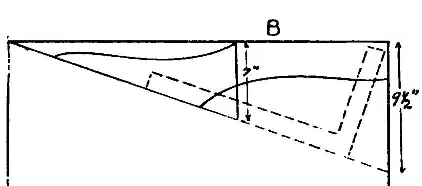
THE CORRECT AND INCORRECT SHAPE FOR STONE HAMMERS

way that had the front part of hind foot cut off to the quick and they went all O. K. and click their shoes only once in a great while.

This is a sandy country and shoeing is a proposition here with reckless drivers behind the horses.

Now, about that fast shoeing. I have shod one or two horses in my time. I did one time take the shoes off the rack, calk, punch and fit my four shoes and nailed and clinched them in fifteen minutes, but I couldn't hold that all day or even half a day. I have put on sixty shoes in nine hours by taking horses as they came and another man fitting for me, and I thought I had done a day's work when I was finished. I do some woodwork but I never use a hound gauge other than the square, and I never have any trouble getting hounds to fit. One time my foreman went to make a set of hounds and he sawed four sets of them, his last set being farther away than the first. Then he asked me to mask and saw them for him. I will give my plan: Suppose your tongue is 4 inches and your axle hounds measure 16 inches at front end and 21 inches at back of hound on the in-





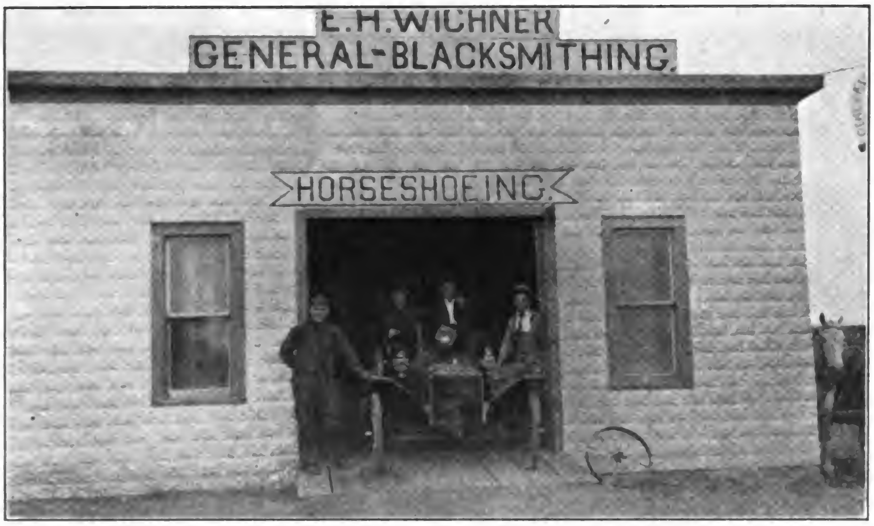
SHOEING A FORGER—LAYING OUT HOUNDS

side. Now take out half the width of the tongue, which leaves 14 inches and 19 inches. Then take one half of this, which is 7 inches in front and 9½ inches at back, as at B. Now take your flitch of 2-inch board; take one straight edge and mark the length of the hound 12, 14 or 16 inches, whatever they may be, and mark with try-square across where you are going to cut off. Now measure down that line and let your square rest with short part of square at the back end until it comes down 9½ inches from the outside edge. Then mark along the square and you have the slope for your hound. Of course, you have to allow for thickness of irons that go on hounds.

Louis Ferrell, Missouri.

Price List of Garfield County (Colorado) Association of Blacksmiths and Horseshoers

Anti-Rattlers, per pair	$ .25
Axle Beds, Buggy, Minimum price	3.00
" " Spring Wagon, Min. price	3.50
" " Concord, 1⅝-inch	23.00
" " 1½-inch	21.00
" " 1¾-inch	27.00
" " 2-inch	33.00
" " for single stub $1.00 extra	
Axle, Setting, (one end), minimum	1.00
" " (both ends)	2.00
Welded, minimum	1.00
Axle, Steel Half Patent 1 & 1⅛-in.	12.00
" " " " 1¼-inch	13.00
" " " " 1⅜-inch	14.00
" " " " 1½-inch	16.00
Axle, Woods, (put in) 2¼ & 2½-in.	5.00
" " " " 2¾, 3 & 3¼-in.	6.00
" " " " 3½, 3¾-in.	7.00
" " " " 4 or over	8.00
Bolsters, Front (Complete) 2½, 2¾ & 3-inch	6.00
" " Complete 3¼ & 3½-inch	6.50
" " Complete 3¾ & 4-inch	7.50
" Hind, Complete 2½, 2¾ & 3-inch	5.50
" " Complete 3¼ & 3½-inch	6.00
" " Complete 3¾ & 4-inch	7.00
" Front, Old Irons Replaced, 2½, 2¾ & 3-inch	3.50
" " Old Irons Replaced, 3¼ & 3½-inch	4.00
" " Old Irons Replaced, 3¾ & 4-inch	4.50
" Hind, Old Irons Replaced, 2½, 2¾ & 3-inch	3.25
" " Old Irons Replaced, 3¼ & 3½-inch	3.50
" " Old Irons Replaced, 3¾ & 4-inch	4.00
Bolsters, Stake Woods for all sizes, Irons Replaced	1.10
Bolsters, Stake Woods, all sizes, New Irons	1.75
Box Straps, Wagon, per set of 8, ½ to ⅝-inch	1.50
Brake Beam Wood	2.50
" Blocks, Hand made, per pair	1.00
" " Factory made, per p'r	1.25
" California Wagon, complete	15.00
" Heavy Spring Wagon	12.00
" Spring Wagon and Buggy, Hand made	10.00
Chain, Log, per lb	.10
" Hooks on 5/16, per pair	1.00
" " " ⅜	1.00
Clips, Center Singletree, Wagon (Put on)	.25
Clips, End Singletree Wagon (Put on) each	.25
Clips, Axle and Sand Board, each	.75
Cross Bars, Buggy Shaft	1.75
" " Express	2.25



MR. WICHNER PAYS CONSIDERABLE ATTENTION TO AUTOMOBILES

Doubletrees, Buggy, Complete, Hand made, per pair	$ 4.50
Doubletrees, Buggy, Complete, Factory made, per pair	3.50
Doubletrees, Plow Woods, Factory Ironed	1.00
Doubletrees, Plow Woods, Not Ironed	.75
Doubletrees and Singletrees, Complete, Hand made, per set	5.00
Doubletrees and Singletrees, Complete, Factory made, per set	4.00
Doubletree Woods, Wagon, Fac. made	1.25
" " " Hand made	1.50
" " " 2x4x48	1.25
" " " 2¼x4½x48	1.50
End Gate, Rods, per rod	.35
" " Tail Nuts	.25
Eveners, 3-Horse, Complete, Factory made	5.50
Eveners, 3-Horse, Complete, Hand made	6.50
Eveners, 3-Horse, Wood only	2.45
" 4- " " "	3.50
Felloes, Sawed, 1⅜ to 2 inches	.40
" " 2½ to 3 "	.75
Fresno Shoes, per pair, min. price	1.75
Hawns, Bent	6.00
" Front, Square, per pair	5.00
" " Single	3.00
" Hind, per pair	4.00
" " single	2.50
" Sway Bar	2.50
" Tongues, Irons Replaced, per pair	3.00
Hawns, Tongues, Irons Replaced, Single	1.75
Hawns, " New Irons, per pair	4.00
" " " " Single	2.25
Iron, All Sizes, per 100 lbs	6.00
King Bolt Clip, Buggy	1.00
" " Wagon, 1⅛-inch	1.00
" " " " Less than 1⅛-inch	.75
Lumber, Hickory, per ft	.15
" Oak, "	.15
" Poplar, "	.15
" Ash, "	.15
Neckyokes, Buggy, Pierson, Light	1.75
" " " Heavy	2.25
Neckyokes, Buggy, Light, Fac. made	1.50
" Wagon, Ironed, 38 to 42 inches	2.25
Neckyokes, Wagon, Ironed, 44 to 48 inches	2.50
Neckyokes, Ironed, 48 inches, Hand Ironed	3.00
Neckyokes, Ironed, 48 inches, Hand Ironed, 4 rings	3.50
Panel Side, Buggy	5.00
" End "	2.50
Picks, Steeled, per end	$ .50
" Sharpened	.25

PLOW WORK

Plow Beams, Medium Size, (put in)	$ 4.50
" " Heavy "	5.00
" " Road "	7.00
" " Straightened "	1.50
" " Handles (put in), per p.	2.50
" " " (not put in)	1.00
" Shares, New, Hand made 10-in.	3.50
" Road Shares, Factory made	6.00
" " " Hand made	7.50
" " " " 12-inch	4.00
" " " " 14-inch	4.50
" " " " 16-inch	5.00
" Shoes, minimum price	2.00
" Cutters, Standing	1.50
" Pointing Lays for 8, 10 & 12-in.	1.00
" " " 14 and 16-inch	1.25
" Road, Pointing Shares for	1.75
" Outside Landside on regular Plows	3.00
Plow Outside Landside on Road Plows	7.50
Plow Sharpening Shares for 10 & 12-in.	.35
" " " " 14-inch	.35
" " " " 16-inch	.40
" " " " Road Plow	.75
" " Cultivator Shovels, each	.15
Plow, Sharpening Single Shovels	$ .25
Plow, Sharpening Planet, Jr., Sweeps each	.30
Poles, Buggy (put in))	5.50
" Heavy Express (put in)	6.50
" Circle (put in)	2.50
" and Shaft Eyes (put on), per pair	2.00
Poles and Shaft Eyes (put on), Bradley, per pair	2.00
Poles, Tips, Buggy	1.00
Queen Rods, Wagon	.60
Quick Shifters, per pair	.50
" " Bradley, put on axles, per pair	1.50
Reaches, Buggy, Straight, (put in)	2.00
" " Double Bend (put in)	2.75
Reaches, Wagon, Finished and Ironed complete, 8 ft	2.00
10 ft	2.25
12 ft	2.50
14 ft	2.75
16 ft	3.00
Reaches in Rough, per running foot	.15

(To be continued)

An Automobile Shop of South Dakota.—Being a reader of "Our Journal," and seeing a great many pictures of shops from all over the country, I thought that some of the brother blacksmiths would like to see what a shop looks like away out west in the Rosebud reservation.

I came out here about two years ago and drew a claim near this town. There was no shop here so I got a building about 16 by 20 and about $60.00 worth of tools and stock and worked in that for a year. Then I built my present shop 60 by 26.

I see a lot in "Our Journal" in regard to cold tire setting. I have a big National Hydraulic cold tire setter which I have had for a year. I have set buggy tires that were very thin and so loose that you could put your finger between the tire and the felloe. I would never think of running a shop without one.

What I like about "Our Journal" is the articles about the automobile and I have gotten a good many pointers from them and hope that you will keep it up. The pictures show an inside as well as an outside view of my shop. I have a great deal of automobile work to do and also handle auto supplies.

E. H. WICHNER, South Dakota.

THE INTERIOR OF THIS SOUTH DAKOTA SHOP SHOWS FURTHER EVIDENCE OF THE IMPORTANCE OF THE AUTOMOBILE

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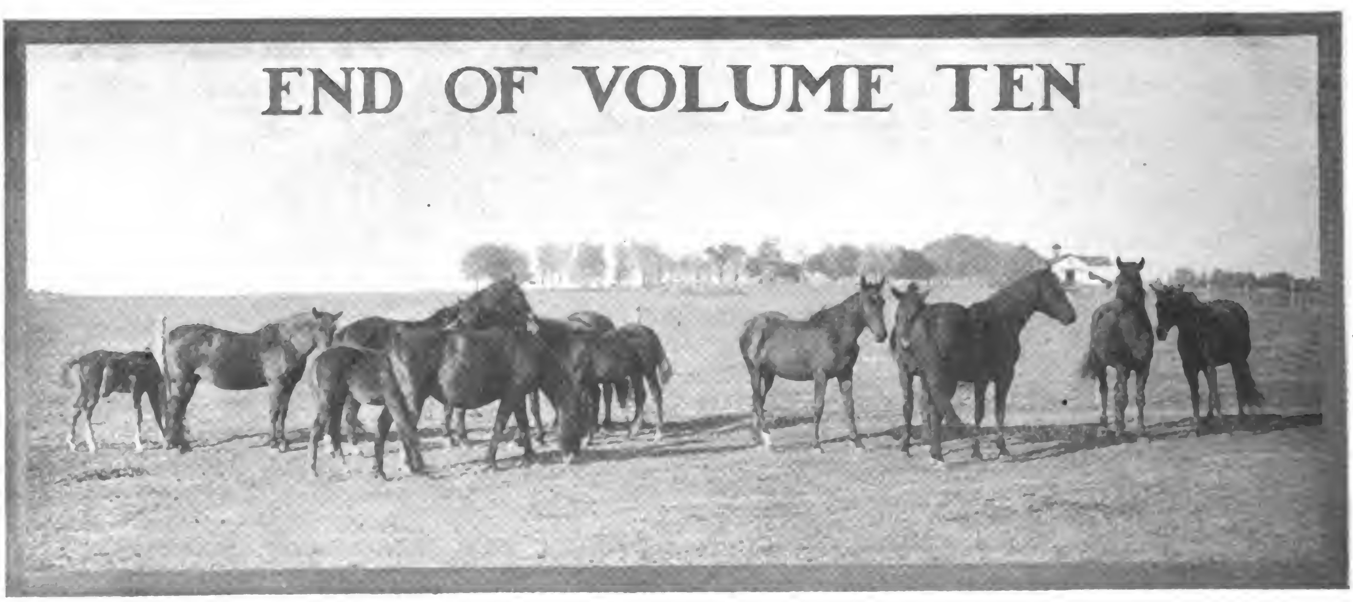

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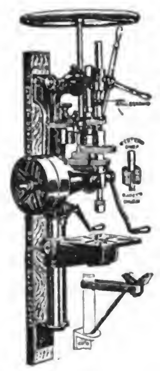

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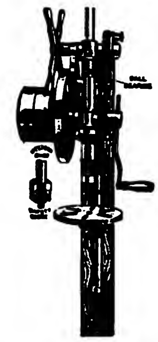

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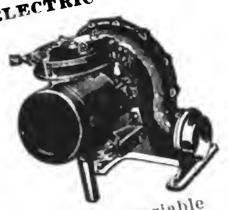

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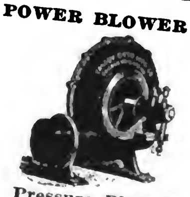

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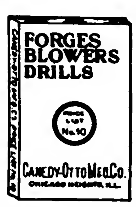

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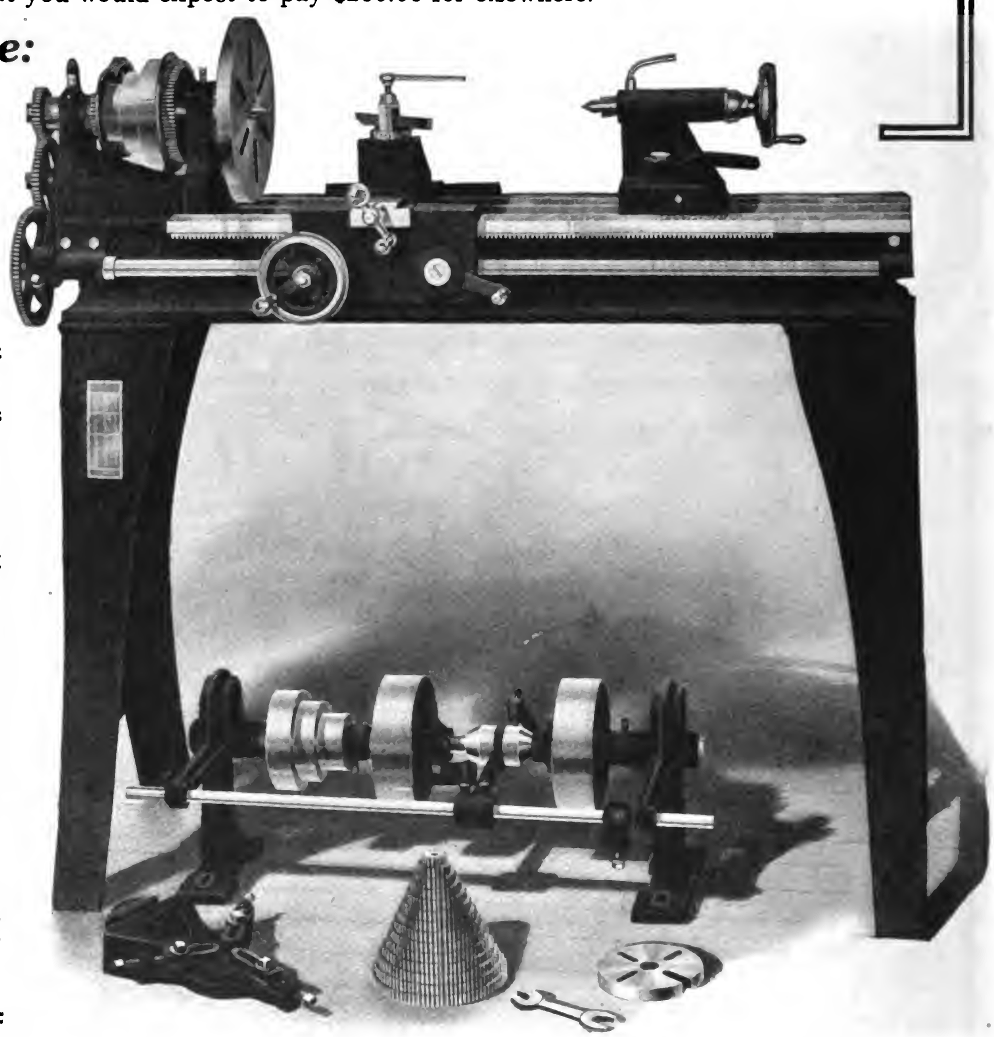

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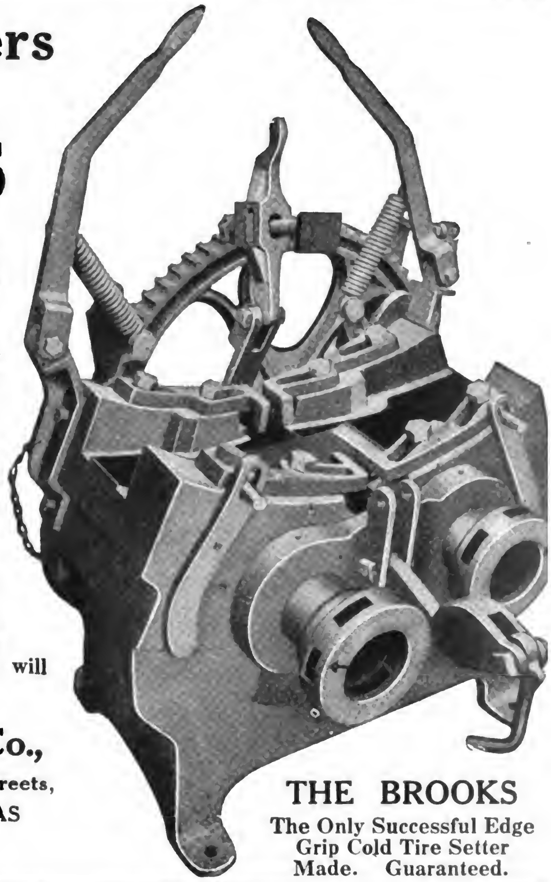

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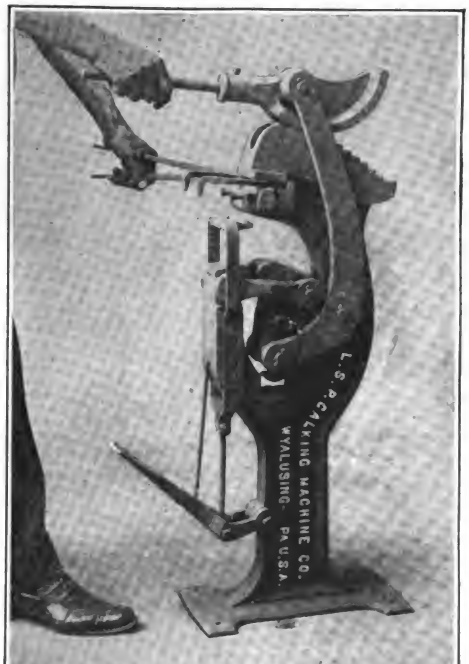

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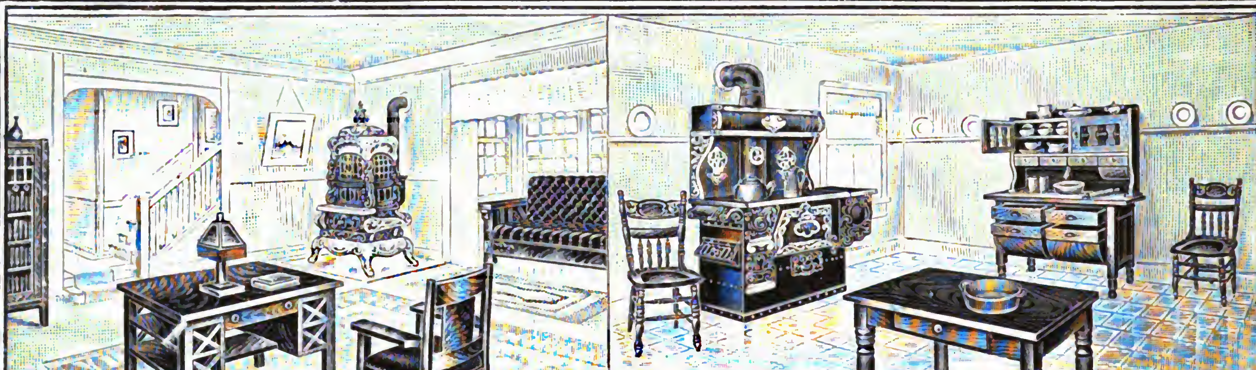

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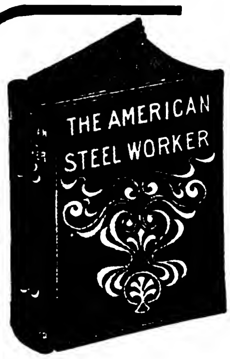

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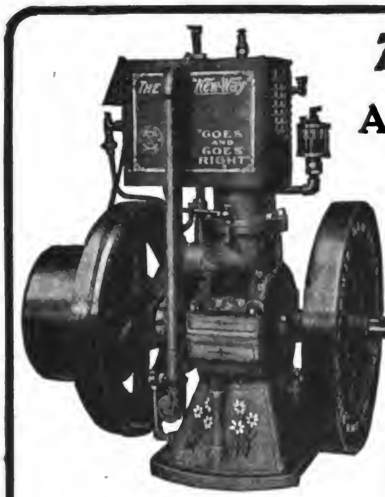

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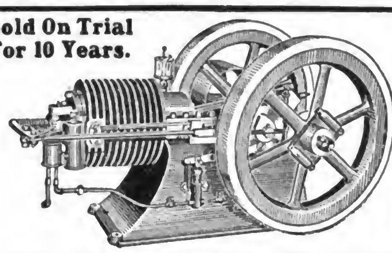

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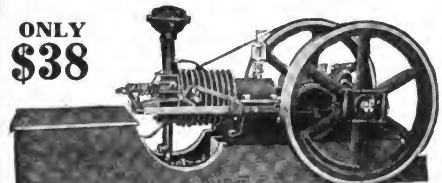

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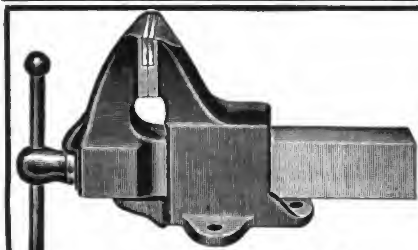

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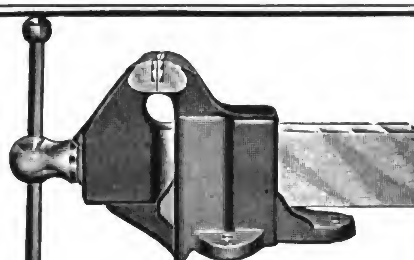

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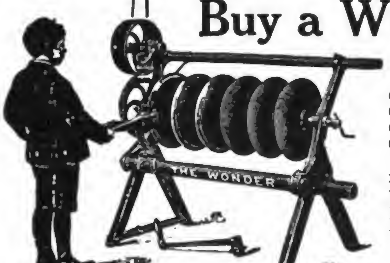

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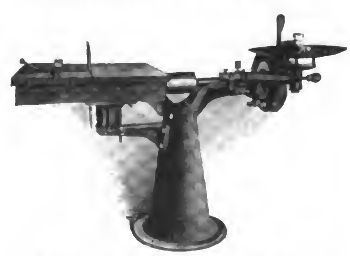

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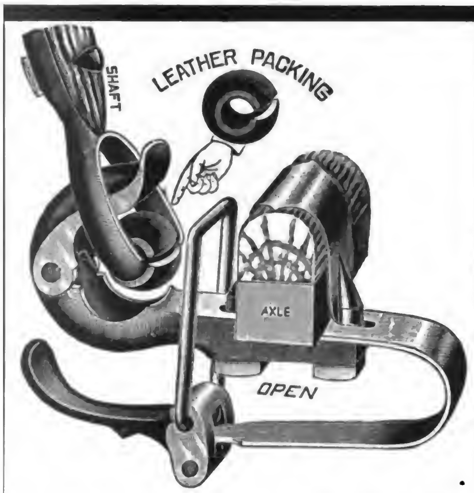

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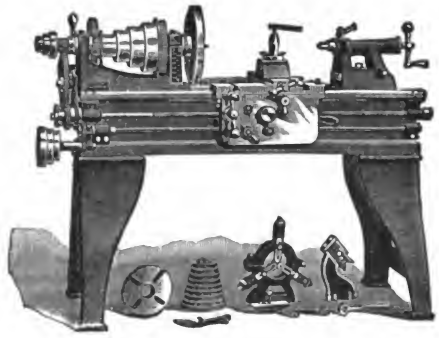

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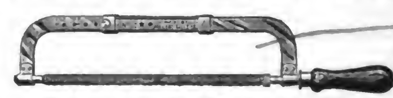

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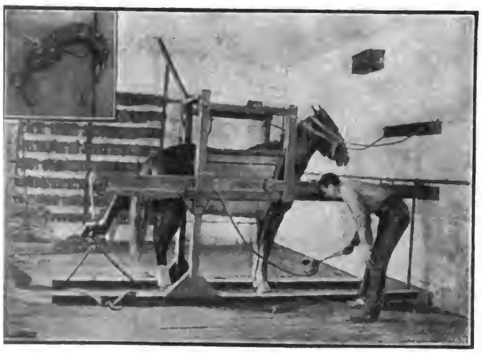

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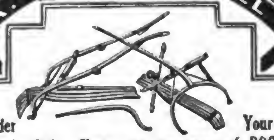

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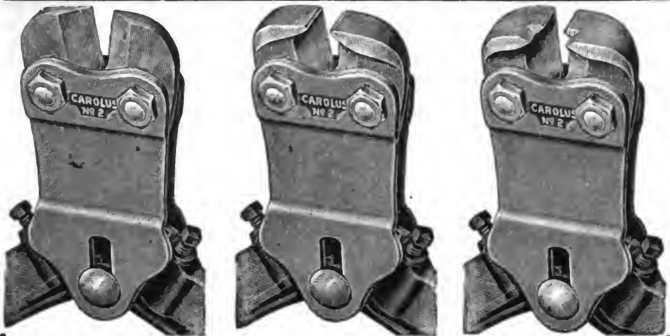

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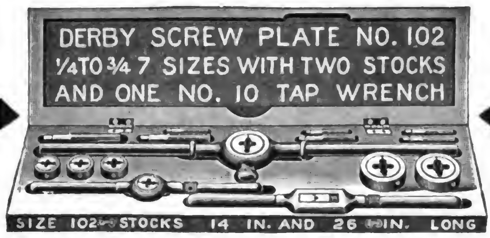

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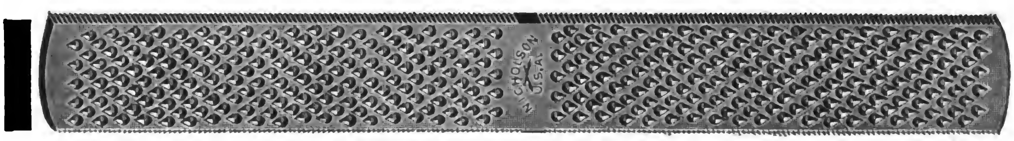

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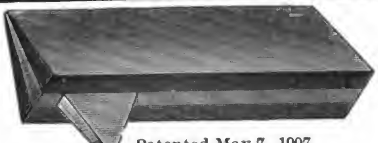

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Watson E. Coleman, Patent Lawyer
622 F Street N. W. Washington, D. C

PATENT YOUR IDEAS

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CHANDLEE & CHANDLEE, Patent Att'ys
Established 16 Years
979 F. Street, Washington, D. C.

WANTED AND FOR SALE.

Want and For Sale advertisements, situations and help wanted, twenty-five cents a line. Send cash with order. No charge less than fifty cents. The small cost of these advertisements prevents our investigating and guaranteeing them. We WILL NOT knowingly accept any but reliable ones.

WANTED—Good general blacksmith and horseshoer. Address **ALPHA JONES, Oregon, Ill.**

WANTED—Second-hand Nordyke and Marmon mill steel frame. **F. M. BLOUNT, Noma, Fla.**

FOR SALE—Electric power blacksmith shop. Write to **FRANK MORRIS, Ritzville, Wash.**

FOR SALE—Blacksmith and garage, shop and tools For terms write to **W. B. HUMPHREYS, Laton, Cal.**

FOR TRADE—80-acre farm. For blacksmith and wagon shop. Give description. **CHAS. SUTTON, Ellington, Mo.**

FOR SALE—400 slightly used Alundum grinding wheels, 1½" x 10½". 60c. each, or 10 for $5.00. **E. E. REMINGTON, Buchanan, Mich.**

FOR SALE—Blacksmith shop, tools and stock. Splendid location. Come and see, or write. (Poor health.) **D. K BEALS, Toledo, Ill.**

WANTED—Commission men to sell buggy tops and carriage trimmings, etc. **FISCHER & METZGER, Cincinnati, Ohio.**

FOR SALE—A new blacksmith stock and tools complete, in good territory. No competition. Good reason for selling. **WM. LEWIS, Winterrowd, Ill.**

WILL TRADE—100-acre farm in Warren County, Ohio, for blacksmith property. **J. H. ANDERSON, Pleasant Plain, Ohio.**

WANTED—To buy or rent general shop in Southern Michigan or Northern Indiana. **P. O. BOX 504, Conneaut, Ohio.**

WANTED—An all around blacksmith and horseshoer. Must be a good shoer. Wages no object to the right man. **PHIL. OWENS, Shabbona, Ill.**

FOR SALE—Blacksmith shop and stock. Seven-room house. Good location and good trade. **H. A. HENKE, Reno, Ill.**

FOR SALE—General repairing and horseshoeing business, with electric power and good stock, tools and machinery. **PAPE & HARRIS, Clinton, Iowa.**

FOR SALE—Good blacksmith business, new shop, 30x40, tools and material. Plenty of work. Reason for selling, bad health. **W. H. ALSTON, R. F. D. No. 1, Troup, Texas.**

FOR SALE—General blacksmith shop, stock, tools, six-room house and lot. Cash business, plenty of work, in country town. Address, **G. T. WHITTEN, Layton, N. J.**

FOR SALE—Or trade for land, blacksmith, carriage and machine shop, house and lots. Best location in richest farming country. I want to quit. **J. A. BAILEY, Spikers, Ind.**

WANTED—Readers to advertise in this column. If you wish to buy, sell or exchange anything, your ad here will be seen and read by thousands of shop owners. Rates are low, only 25c. per line for one insertion. Figure about seven words to the line and count in name and address. Send cash with order. Advertisements received by the 15th of the month will appear in the following month's issue. Write to

American Blacksmith Company, Box 974, Buffalo, N. Y.

FOR SALE—On account of death, horseshoeing shop and farm of 53 acres, with house, barns, horses, cattle, etc. For further information inquire of owner. **ANDREW LUVEN, Swanson, Mich.**

FOR SALE—Cheap, two American calking machines. Used less than month, so are good as new. Will sacrifice because changing business. **A. A. A., care American Blacksmith Co., Buffalo, N.Y.**

FOR SALE OR RENT—A power-equipped blacksmith and repair shop and 4 acres of land. Good trade. Work for three men the year around. Address, **BENTON PRICE, Box 57, Glendale, Ky.**

FOR SALE—My entire wood and iron stock with tools, for $400.00. In good location, and good paying business for a good man. Address, **A. MATHIES, West Kimmswick, Mo.**

WANTED.—Traveling men who visit the carriage, implement and livery trade make big commissions selling our steel and rubber-tired wheels, poles and shafts as a side line. Why don't you try it? **THE A. BOOB WHEEL CO., Cincinnati, O.**

FOR SALE—McGovern power tire shrinker good as new. Have two and only need one. Cost $600.00, will take $190.00, or what have you to exchange. Address, **No. 554 Freeman Ave., Cincinnati, O.**

FOR SALE—Up-to-date blacksmith shop with machinery and power equipment, together with five acres of orchard, store and hall. Splendid business and excellent proposition for some one. Price, $8,000. Inquire, **C. G. SIGURD, San Jose, Cal.**

FOR SALE—A general blacksmith shop, stock and tools. Fine ten room house and lot. Good location and good trade. Going to Canada, reason for selling. A bargain. Address, **GEO. M. ANDERSON, Box 267, Velva, N. Dakota.**

FOR SALE—My blacksmith tools and stock. Good location. New shop, 24x50. Rent reasonable. Plenty of work for two men. Prices good. Reason for selling, going on a farm. Address, **E. J. MILTON, 106 N. Center St., Beaver Dam, Wis.**

FOR SALE—Horseshoeing business, stock, tools and fixtures. Good location, good prices and custom. Mostly light horses. Blacksmithing may be done also. Price, $175.00. Investigate. Address, **TED EGGERS, Washington, Iowa.**

FOR SALE—Blacksmith shop, 26x48. 2-story building. Good business, work enough for two men. Must be good horseshoer. A bargain at $700.00, with stock and tools. **THEODORE J. OLSOWY, Box 6, Minden City, Mich.**

FOR SALE—Two-story blacksmith and wood shop. Will sell together or separate. Well equipped. Gasoline power. Good horseshoeing business. Established thirty years. Will sell at a bargain. If interested, write for general description. **THEO. VOGEL & CO., Pocahontas, Mo.**

FOR SALE—All Steel Jointer Heads, 6 to 16 in., complete with knives, pulley and cast frame that head runs in, ready to bolt to wood frame, which any wood workman can readily make from the instructions we furnish. We also make the very best combination outfits, 6 or 8 in. jointers, saw arbor and boring attachment, all made from a solid bar of steel. Write for illustrated circular and prices. **W. L. SHERWOOD, Kirksville, Mo.**

FOR SALE—Good, up-to-date, 2-story power shop, 25x50, with all improvements, two forges, drill, Little Giant punch and shear, Barcus horse stocks, emery and saw, tire bender, Hydraulic cold tire setter, 8-horse engine, line shafts, feed mill and complete set of small tools. Good 4-room dwelling house in connection. On account of ill health will sell for $2,000. Address, **W. E. RITTER, Cache, Oklahoma.**

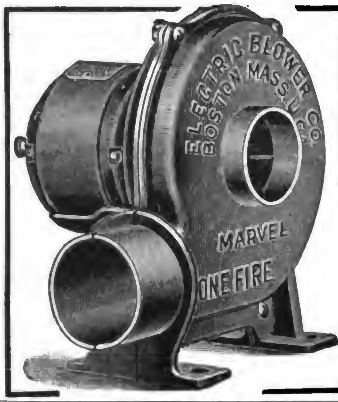
GOES LIKE SIXTY SELLS LIKE SIXTY SELLS FOR SIXTY **$60**
GILSON GASOLENE ENGINE
For Pumping, Cream Separators, Churns, Wash Machines, etc. FREE TRIAL
Ask for catalog—all sizes
GILSON MFG. CO. 39 Park St. Port Washington, Wis.

"NEW EASY" 4 Sizes **BOLT CLIPPERS** "EASY" 2 Sizes

THE GENUINE TOOL

KNOWN AND PREFERRED EVERYWHERE

H. K. PORTER EVERETT, MASS. U. S. A.



Trade Literature and Notes.

A NEW 1911 CATALOGUE, of 95 pages, handsomely bound in red and gold, has just been received from Butterfield & Company, of Derby Line, Vt., describing, pricing and illustrating their screw plates, tapes and dies, reamers, etc., All readers interested in this line of tools should write the above company for this booklet, sent free on request.

OUR READERS will notice the advertisement of the Apex Horseshoe Company, Albion, Mich., on page 31 of this issue. We believe that it will pay our many readers to secure a copy of the booklet entitled "Facts about Apex Horseshoes."

The manufacturers tell us that these shoes will cure sore feet and keep them sound, and allow the shoer as much profit selling them and putting them on as any other shoe.

A copy of this booklet will be forwarded free to any one of our readers mentioning THE AMERICAN BLACKSMITH when writing.

ANNOUNCEMENT IS MADE that on and after August 1st the Federal Rubber Mfg. Co., of Milwaukee, Wis., has had its own branch in Chicago.

This is one of the first branches established by the new tire company and is in line with its policy to have branches and agencies in all of the principal cities of the country.

Mr. George W. Stephens, formerly with the American Tire & Rubber Co., is manager of the new branch, and Mr. Frank Loofbourrow has severed his connection with the United States Tire Co. to become assistant manager.

The new quarters at 1434 Michigan Ave. are commodious, and the new Company enters the Chicago market particularly well fitted to get business, both because of its desirable location and the personnel of the people in charge.

The territory covered by the Chicago branch will be the entire States of Illinois and Iowa and the northern portion of Indiana.

ONE OF THE MOST COMPLETE pieces of literature ever prepared on woodworkers is the catalog recently received describing the "FAMOUS" line which is built by the Sidney Tool Co.

The catalog is of a handy pocket size, well written and illustrated, and covering every possible feature connected with woodworkers. The forepart explains how one machine is made to take the place of sixteen, besides effecting an economy in labor, in time and floor space.

Over half the catalog is descriptive of the woodworker itself, its construction and operation. A strong claim is made for the absolute simplicity of the whole machine and the ease by which the adjustments for the different operations are made.

An indication of the success the machine has met with by blacksmiths, contractors, carpenters, etc., lies in the statement that over eight hundred machines have been sold in a little over two years and that not one has ever been returned or reported upon adversely.

Our readers would do well to write for this catalog, as it is sent free upon request to The Sidney Tool Co., Sidney, Ohio.

TRADE BUILDING. It has been said that ninety-five percent of all business men fail. In spite of these disheartening figures, however, the ranks of the fallen are quickly filled with new hopefuls, each of whom feels that *he* is to *succeed*. This preliminary self confidence is the fundamental force to which we owe all achievement.

Probably no other industrial calling shows a larger number of struggling men working in the dark than that of the blacksmith. This condition has been carefully analyzed by members of the craft themselves—leaders who have had the interests of their fraternity at heart—and their universal verdict is that the blacksmith is one of the slowest to *grasp his opportunities!* Yet no toiler toils more faithfully.

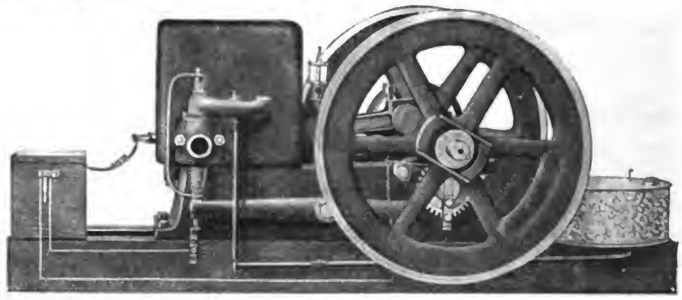
In this connection there has been published within the last few days a helpful booklet for blacksmiths and wheelwrights. It deals with the question of how to *get* and how to *keep* new business. Also how to increase profits on both present and new business without increasing prices. Any blacksmith or wheelwright can secure one of these valuable booklets, *free*, by writing to the Brooks Tire Machine Company of Wichita, Kansas, or Buffalo, New York.

THE FIVE BOOKLETS TELL HOW. Valentine & Company think a recent writer on varnish topics is not abreast of the times, who says—"the time comes—in these fast days is sure to come—when an unusually quick method of painting and finishing a carriage body from the wood up, is called for." Valentine & Company say the answer is right here now, and the word is Vanadium. The merit claimed for the Vanadium Varnishes is extreme rapidity with no sacrifice of brilliancy and permanency.

A series of five booklets has been issued by them that gives the story of the Vanadium line in a way that will prove interesting and informing. Valentine & Company, New York City, offer to send these booklets to anyone who asks for them.

One of the booklets describes the Celox Four Day System which takes a job from the wood up—from Tuesday morning to Saturday morning.

THE WITTE IRON WORKS of Kansas City, Missouri, manufacturers of the famous "Witte Jr." gasoline engine, tell a very interesting story of one of their agents, a blacksmith, who in less than three months sold over $5,000 worth of Witte Gasoline Engines. This agency was only as a side line to his business and taken care of only when he was not busy with his regular work. He hustled, and that was all that was necessary when he had an agency for a simple, well built engine. They cite this is only one example of the success achieved by this new way which they have introduced for selling their engines. They believe the blacksmith to be the proper person through whom to reach the people most likely wanting to buy a gasoline engine. As the mechanical man of the community, the smith is regarded as an expert on such matters. The people also feel that he can order the engine for them, show them how to operate it and look after it in the future, if any help should be required.



WITTE JR. GASOLENE ENGINE.

The Witte Company guarantee every engine they make for five years, and agree to refund money for any engine that does not fulfill this guarantee. Such a guarantee leaves little chance for a purchaser to be discontented, and this is a big help in selling goods of any kind.

This firm is desirous of obtaining more blacksmiths in all parts of the United States to act as agents for their gasoline engines and they present many arguments in favor of the plan. We understand their inducements are very good and that they help their agents to get the business and then aid them to keep it. With the first sample engine bought, they send a full line of catalogues and circulars. If you desire, they will write all prospective customers and point out the advantages and improvements, thereby aiding in making sales. Only one agency is established in each locality, so there is no competition.

This plan could be undertaken as a side line and in dull times would give the smith something to do, instead of putting in time around the shop. The sample engine need not only be used for demonstration but can be used for your own power as well. There are few side lines that present as favorable conditions for good profits as the sale of gasoline engines at the present day.

The Witte Iron Works tell us these engines are made in any style and from 2 to 8 H. P., so that they will meet most every requirement. They are so simply constructed that the operator need only follow instructions to install it and start it up. Nearly every blacksmith has need of some kind of gas engine and so has every opportunity to increase his sales by merely telling his customers of the good points about the engine and its reliability; which he can safely do, owing to the guarantee accompanying each engine.

We understand that a great number of blacksmiths from all parts of the United States have applied for agencies and on being appointed agents for this engine have become very enthusiastic over this popular priced line of goods.

If you are interested in the proposition of becoming an agent for this engine, write to the Witte Iron Works Company of Kansas City, Mo., for their introductory catalogue, which will give you all the information that you may wish to have.

KEROSENE. Kerosene as a fuel for gas engines is at last coming into more general use, particularly for farm or shop power.

It is cheap, easily obtained and safe. It does not affect insurance rates if purchased in quantities, and it produces as much power as gasoline.

There are now on the market engines built especially for kerosene which are more simple than the usual gasoline engine.

Such engines are made in various sizes, adapted for every purpose, and are said to be very reliable and satisfactory, besides costing much less to run than does a gasoline engine.

An example of this type of engine is the Columbia, made by the Columbia Engine Company, of Detroit, Mich., whose advertisement appears on another page. The makers of this engine claim that they have about the most simple and economical engine on the market, and state that prices for the various sizes are exceedingly low.

The Company has named its 3-H. P. engine "Coal-Oil Johnny," after the original "Coal-Oil Johnny" after his discovery of oil in Pennsylvania.

The Columbia Engine Company states that every engine is carefully tested and fully guaranteed for five years.

THE MUNCIE WHEEL CO., Muncie, Ind., are publishing bargains on wheels and gears which every reader who wants to save money should note carefully. This well-known firm have always made a specialty of selling wheels direct to carriage builders and blacksmiths. You can depend on always being treated right in doing business with them and that your orders will receive very prompt attention. As stated in previous advertisements which have appeared in The American Blacksmith, that wheels they quote on are carried in stock and can be shipped immediately on receipt of order. They further state that the freight is prepaid on shipments of three sets or more to all points east of the Mississippi River.

Index to Advertisers will be found on page 19

CLASSIFIED BUYER'S GUIDE.

To Find Address of any Firm given here, consult their advertisement.

For its location in this issue, see Index on Page 21.

Anvils.
Columbus Anvil & Forging Co.
Columbus Forge & Iron Co.
Eagle Anvil Works.
Hay-Budden Mfg. Co.
Horace T. Potts Co.
Wiebusch & Hilger.
Peter Wright & Sons.

Aprons, Leather.
California Tanning Co.

Automobile Specialties.
Cray Brothers.

Axles.
Timken Roller Bearing Axle Co.

Axle Gauge.
Cray Bros.

Axle Nuts.
Cray Bros.

Bicycles.
Mead Cycle Co.

Blacksmiths & Wagon Builders Tools & Supplies.
Beals & Co.
Buffalo Forge Co.
Campbell Iron Co.
Canedy-Otto Mfg. Co.
Champion Blower & Forge Co.
Champion Tool Co.
Cray Bros.
Cummings & Emerson.
Heller Bros.
E. F. Reece Co.
Silver Mfg. Co.
Wells Bros.
Wiley & Russell.

Blowers.
Buffalo Forge Co.
Canedy-Otto Mfg. Co.
Champion Blower & Forge Co.
Connersville Blower Co.
Electric Blower Co.
Roth Bros. & Co.

Bolt Clippers.
Champion Tool Co.
H. K Porter.

Bolt Cutters.
H. B. Brown & Co.
Wells Bros.

Brazing Compound.
Phillips-Laffitte Co.

Brazing Forge.
The National Cement Mfg. Co.

Brazing Sleeves.
H F White.

Built Up Wood.
Joel H. Woodman.

Calks.
American Horseshoe Co.
Franklin Steel Works
Phoenix Horseshoe Co.
Rhode Island Perkins Horseshoe Co.
Rowe Calk Co.

Calking Machines.
L. S. P. Calking Machine Co.

Carriage Top Dressing.
West Mfg. Co.

Carriage Specialties.
C. C. Bradley & Sons.
Cray Brothers.
Fisher & Metzger.

Coal.
Pennsylvania Coal & Coke Co.

Coke.
Bourne Fuller Co.
Pennsylvania Coal & Coke Co.

Disc Grinders.
A. E. Durner.

Drills.
Buffalo Forge Co.
Canedy-Otto Mfg. Co.
Champion Blower & Forge Co.
Silver Mfg. Co.

Emery Grinders.
Kerrihard Company.
Crescent Machine Co.

Emery Wheels.
Chicago Wheel & Mfg. Co.

Fifth Wheels.
Dayton Malleable Iron Co.

Files & Rasps.
Heller Bros. Co.
Nicholson File Co.

Forges.
Buffalo Forge Co.
Canedy-Otto Mfg. Co.
Champion Blower & Forge Co.
Silver Mfg. Co.

Gas, Gasoline and Oil Engines.
Angola Engine & Foundry Co.
Columbia Engine Co.
Cray Bros.
Foos Gas Engine Co.
Gade Bros. Mfg. Co.
Wm. Galloway Co.
Gilson Mfg. Co.
Ideal Gas Engine Co.
International Harvester Co.
New Way Motor Co.
Sidney Tool Co.
M. Steiner & Co.
Witte Iron Works Co.

Gas Lamps.
Brilliant Gas Lamp Co.

Gears.
Akron Selle Co.
Muncie Wheel Co.

Hammers.
Champion Tool Co.
Heller Bros.

Hoof Nippers.
Lowe Mfg. Co.
Muncie Wheel & Jobbing Co.

Horseshoes.
American Horse Shoe Co.
Apex Horse Shoe Co.
Bryden Horseshoe Co.
Phœnix Horseshoe Co.
Rhode Island Perkins Horseshoe Co.
U. S. Horseshoe Co.

Horseshoe Nails.
Capewell Horse Nail Co.
Union Horse Nail Co.

Horseshoe Pads.
Revere Rubber Co.

Horse Stocks.
Geo. Barcus & Co.
Hemphill Horse Stock Co.

Household Goods
Spiegel, May, Stern Co.

Hub Borers.
Abbott & Co.
Silver Mfg. Co.
Phineas Jones Co.

Igniters.
Knoblock-Heideman Mfg. Co.

Iron.
Bourne Fuller Co.
Milton Mfg. Co.

Lathes.
Sears, Roebuck & Co.
Sebastian Lathe Co.
Sidney Tool Co.

Lighting Systems.
Brilliant Gas Lamp Co.

Magnetos.
Knoblock-Heideman Mfg. Co.
Hercules Electric Co.

Nuts.
Milton Mfg. Co.

Paints & Varnishes.
Felton, Sibley & Co
Valentine & Co.
Geo. E. Watson Co.

Patent Attorneys.
Chandlee & Chandlee.
Watson E. Coleman.
Herbert Jenner.
Richard B. Owen & Co.
C. L. Parker.
Geo. E. Tew.

Planes.
Gage Tool Co.

Plow Shares.
Crescent Forge & Shovel Co.
Star Mfg. Co.

Poles.
Boob Wheel Co.
Crandal, Stone & Co.

Power Equipment.
W. A. Jones Foundry & Machine Co.

Power Hammers.
Fairbanks, Morse & Co.
Kerrihard Company.
Macgowan & Finigan.
Mayer Bros.
Modern Sales Co.
Star Foundry Co.
West Tire Setter Co.

Printers.
Hausauer-Jones Printing Co.

Punches.
Badger State Machinery Co.
Bertsch & Co.
Buffalo Forge Co.
Little Giant Punch & Shear Co.

Rubber Tires.
Federal Rubber Mfg. Co.
Goodyear Tire & Rubber Co.

Rubber Horse Shoes.
Revere Rubber Co.
Walpole Rubber Co.

Saws, Band.
Crescent Machine Co.
Sidney Tool Co.
Silver Mfg. Co.

Saws, Hack.
Millers Falls Co.

Screw Plates.
Butterfield & Co.
Hart Mfg. Co.
E. F. Reece Co.
Wells Bros. Co.
Wiley & Russell Mfg. Co.

Shafts.
Boob Wheel Co.
Crandal, Stone & Co.

Shaft Couplings.
C. C. Bradley & Son.

Shaft Ends.
Crandal, Stone & Co.

Shafting.
W. A. Jones Fdy. & Mach. Co.

Shears.
Badger State Machine Co.
Bertsch & Co.
Buffalo Forge Co.
C. D. Edwards.
Little Giant Punch & Shear Co.

Shop Signs.
G. W. Grove.

Soap.
Skat Mfg. Co.

Spoke Machines.
House Cold Tire Setter Co.
Silver Mfg. Co.

Springs.
Harvey Spring Co.
Raymond Mfg. Co.

Steel Stamps.
Geo. M. Ness, Jr.

Steel.
Bourne Fuller Co.

Steel Shapes.
Crescent Forge & Shovel Co.
Star Manufacturing Co.

Steel Tires.
Barbour Steel Tire Co.

Stocks & Dies.
Butterfield & Co.
Canedy-Otto Mfg. Co.
Champion Blower & Forge Co.
Hart Mfg. Co.
E. F. Reece Co.
Wells Bros. Co.
Wiley & Russell.

Tempering Powders.
Phillips-Laffitte Co.

Tenoning & Boring Machines.
Silver Mfg. Co.
Sidney Tool Co.

Tire Heaters.
Rochester Tire Heater Co.
West Tire Setter Co.

Tire Setters.
Brooks Tire Machine Co.
House Cold Tire Setter Co.
Keokuk Hydraulic Tire Setter Co.
Lourie Mfg. Co.
Rochester Tire Heater Co.
West Tire Setter Co.

Tire Shrinkers.
Buffalo Forge Co.

Tools.
Champion Tool Co.
Geo. A. Cutter.
Heller Bros.
Millers Falls Co.
Sidney Tool Co.

Tops & Trimmings.
Buob & Scheu.
Fischer & Metzger.
Indiana Top & Vehicle Co
West Mfg. Co.

Transfer Signs.
Palm, Fechteler Co.

Twist Drills.
Cleveland Twist Drill Co.

Varnishes.
Valentine & Co
Geo. E. Watson.

Vehicles.
Buob & Scheu.

Veterinary Remedies.
Newton Horse Remedy Co.
W. F. Young.

Vises.
Eagle Anvil Works.
Chas. Parker Co.
Prentiss Vise Co.
Rock Island Mfg. Co.

Washers.
The Milton Mfg. Co.

Welding Compound.
Anti-Borax Compound Co.
Cortland Welding Compound Co.
N. D. Doxey.
Weldarine Mfg. Co.

Welding Plates
Chicago Metal Reduction Co.

Wheels.
Boob Wheel Co.
Buob & Scheu.
Cray Bros.
A. E. Stevens.
Muncie Wheel Co.

Wheels, Metal.
C. Bush.
Electric Wheel Co.
Empire Mfg. Co.

Wood Working Machinery.
Buffalo Forge Co.
Crescent Machine Co.
Sidney Tool Co.
Silver Mfg. Co.

Wrenches.
Geo. A. Cutter.

Current Heavy Hardware Prices.

The following quotations are the lowest prices generally prevailing August 24, 1911. They are subject to change without notice, and higher prices are charged according to quality, specifications and other conditions.

The only changes in market quotations this month are reported on iron and steel. These changes have been noted. Further reductions, especially on steel bars, are expected. It is hard to say when this reduction will occur, but it will no doubt happen before the end of the year.

Business is generally reported good. The demand for wood stock continues.

Collections are reported as very good. Smiths generally, and especially in the country districts, will do well to push collections hard from now on, when they know the farmers are getting the cash.

Horse Shoes—

All Iron Shoes	$4.40
Steel Shoes	4.25
No. 0 and No. 1 25c. extra. 15c. per keg additional charged for packing more than one size in a keg	
Mule Shoes	4.90
X. L. Steel Shoes	5.50
Countersunk Steel Shoes	6.00
Tip Shoes	5.75
Goodenough, heavy	6.00
Goodenough, sharp	6.50
Toe Weight	7.00
Side Weight	9.25
E. E. Light Steel	5.50
Steel Driving	5.50
O. O. Mule Shoes, extra	1.50

Merchant Bar Iron—
$1.75 rates, full extras and 20 cents per 100 pounds extra for broken bundles.

Steel Bars—
$1.80 rates, full extras.

Toe Calks— Per box.

Blunt	$1.25
Sharp	1.50

Plow Lays—

Solid Cast	$.08½
Crucible	.09½
Soft Center	.12

Fitted Plow Lays—

Crucible, 12"	$1.50
Crucible, 18"	1.90
Soft Center, 12"	1.90
Soft Center, 18"	2.45

Quick Repair Lays—

Crucible, 12"	$1.40
Crucible, 18"	1.70
Soft Center, 12"	1.80
Soft Center, 18"	2.25

Hickory Lumber—Per Foot—

1 to 2½	$.09
2½ to 4½	.10

Ash and Oak Lumber—Per Foot—

1–1¼	$ .07	2½–3	$.08
1½–2	.07½	3½–4	.09

Yellow Poplar Lumber—Per M. Feet—

	6 to 12	13 to 17	18 to 24
[illegible]"	$70.00	$70.00	$80.00
[illegible]"	70.00	73.00	85.00
[illegible]"	73.00	80.00	90.00
[illegible]" }	77.00	85.00	109.00

Rough Hickory Axles— Each.

3 x 4 6 ft	$ .55
3½ x 4½ 6 ft	.90
4 x 5 6 ft	1.10
5 x 6 6 ft	2.00
4 x 5 6½ ft	1.20
4½ x 5½ 6½ and 7 ft	1.80
5 x 6 6½ and 7 ft	2.50
5½ x 6½ 7 ft	3.00

Finished Hickory Axles—

For 2½ and 2¾ Skeins	$ .95
For 3 Skeins	1.10
For 3¼ Skeins	1.35
For 3½ Skeins	1.50
For 3¾ Skeins	1.80
For 4 Skeins	2.10

Rough Oak Bolsters—

Short	$.07½
12–14–16 ft	.08½

Finished Oak Bolsters—

2¾ x 3¾ and under	$ .60
3 x 4	.65
3¼ x 4¼	.80

Rough Oak Wagon Tongues—

4 x 4 x 2 x 4 x 12 and smaller	$ .95

Finished Oak Wagon Tongues—

3½ and smaller	$1.30
3¾	1.35
4	1.40

Two Inch Sawed Hounds Per Pair

Tongues	$ .35
Front	40
Hind	.50

Patent Wheels—

A. B. No.13 and under	45 %
D. No. 13 and under	35–5 %
All Grades, No. 17 to 33	35–5 %
All Grades, No. 39 and Larger	25–5 %
C. No. 13 and under	40–2½ %

Cupped Oak Hubs—	Set.	Plain End Oak Hubs—	Set.
7 x 8 x 9	$1.30	10 x 14	$3.30
7 x 9 x 10	1.50	11 x 14	4.20
8 x 9 x 10	1.55	11 x 15	4.50
8 x 10 x 11	1.80	11 x 16	5.10
9 x 10 x 11	1.95	12 x 16	5.75
9 x 11 x 12	2.00	12 x 17	6.30
10 x 12 x 13	3.00	13 x 18	7.00
11 x 13 x 14	4.20		
12 x 14 x 15	5.10		

Rough Sawed Felloes-

1½ x 2"	$1.45	2 x 2½"	1.85
1¾ x 2¼"	1.65	2½ x 2"	4.35
1¾ x 2⅜"	1.75	3 x 3"	5.25
		3 x 3½"	5.50

Ironed Poles, White, XXX—

1¾ x 2½" No. 2	$3.80
2 x 2½" No. 3	3.80

Ironed Shafts, White, XXX—

1⅜" x 2" and smaller	$1.95
1½ x 2"	2.20
1½ x 2¼"	2.70

Farm Wagon Bows—

Round Top, ½ x 2"	$ .60
Flat Top, ½ x 2"	.75
Round Top, ⅝ x 2½"	1.35

Standard size Piano Bodies with Seats—

Each	$4.25

Plow Beams—

1 Horse	$ .60
2 Horse	.75
3 Horse	1.10

All Hickory and Oak Spokes and Patent Spokes-
Discount from Weis & Lesh List No. 5 .. 5%

Wagon Neck Yokes—

	Forest	Mixed Second Growth	White Second Growth
2½ x 38"	$2.05	$2.80	$4.00
2½ x 42"	2.70	3.90	5.25
2¾ x 46"	4.15		
3 x 44"	4.35	6.70	8.38
3 x 48"	5.25	7.50	10.00

Single Trees—Oval—

	Forest	Mixed Second Growth	White Second Growth
2½"	$1.50	$2.70	$3.35
2⅝"	1.60	2.75	3.50
2¾"	1 65	2.80	3.65
3 x 36"	2.30	3.30	4.10
3 x 38"	2.35		
3 x 40"	2.50	3.85	4.65

Single Trees—Round—

	Forest	Second Growth
2¼"	$1.90	$3.45
2½"	1.90	3.50
2⅝"	2.00	3.60
2¾"	2.65	4.10
3"	3.20	4.65

Oval Plow Doubletrees—		Flat Plow Doubletrees—	
2¾ x 36"	$1.60	1¾ x 3½ x 42"	$2.75
3 x 40"	2.40		

Wagon Doubletrees—

2 x 4 x 48"	$3.40
2½ x 48"	4.50
2¼ x 4½ x 50"	4.90
2¼ x 4½ x 52"	5.25
2¼ x 5 x 52"	6.00
2½ x 5 x 54"	6.75
Mixed Second Growth	50 % advance
White Second Growth	100 % advance

Oval Plow Singletrees— Forest

2¼ x 30" and under	$ .90
2½ x 30" and under	1.15

Buggy Doubletrees—

	Forest	Mixed Second Growth	White Second Growth
2¼" and smaller	$2.50	$3.50	$4.50

Express Doubletrees—

	Forest	Mixed Second Growth	White Second Growth
2½"	$2.80	$3.55	$4.80
2¾"	3.40	4.50	5.25
3"	3.40	4.15	5.50

E xpress Singletrees, Turned—

	Forest	Mixed Second Growth	White Second Growth
2⅛"	$2.25	$2.50	$3.50
2¼"	2.75	3.50	3.75
2½"	3.25	3.75	4.50

Express Singletrees, Square Center—

	Forest	Mixed Second Growth	White Second Growth
2¼"	$2.75	$4.00	$5.00
2½"	3.25	5.20	5.75

Buggy Neck Yokes—

	Forest	Mixed Second Growth	White Second Growth
2 x 42"	$2.60	$3.25	$4.25
2⅛ x 2¼ x 42"	3.00	3.50	5.00

HONEST DEALINGS

Before a display advertisement is accepted for this Journal, inquiry is made concerning the standing of the house signing it. Our readers are our friends and their interests will be protected. As a constant example of our good faith in *The American Blacksmith* advertisers, we will make good to subscribers loss sustained from any who prove to be deliberate swindlers. We must be notified within a month of the transaction giving rise to the complaint. This does not mean that we will concern ourselves with the settlement of petty misunderstandings between subscribers and advertisers, nor will we be responsible for losses of honorable bankrupts, nor can it include advertisements under the head of "Wanted and For Sale."

Roth Forge Blowers

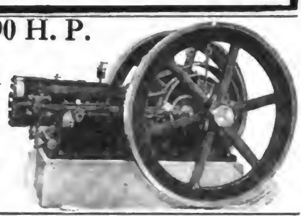
A Cast Iron Cover with machined joints protects the WORKS. Cover can be easily opened on its hinge to see the WORKS. Ask for information.

ROTH BROS. & CO.

136 Liberty Street NEW YORK — 1390 West Adams Street CHICAGO, ILL.

THE FOOS

OIL ENGINE, 6 to 90 H. P.



Mechanically as attractive as a high grade Corliss, in addition to fuel costs so low that a gasoline engine would be expensive at one third the price. The Foos Oil Engine will produce as much horse power on oil at 2½ to 7 cents as a gasoline engine with fuel at 12 to 18 cents a gallon. The Oil Engine will save enough in running expense to repay the purchase price three or four times in less than ten years. Send for description of structural details and fuel data contained in BULLETIN K. O.-49.

THE FOOS GAS ENGINE CO., 904 Linden Avenue, SPRINGFIELD, OHIO

The Little Giant Edge Grip Hydraulic Cold Tire Setter

The Tire Setter of Quality not Quantity

while representing the best features found in other hydraulic tire setters, has several peculiar to itself. One of the main features always held before the Little Giant manufacturers is that all their tire setters must combine the maximum of everything in the edge grip tire setter building with the minimum of cost of operation and maintenance.

First Cost Is Last Cost

For description, prices, etc., address,

THE KEOKUK HYDRAULIC TIRE SETTER CO.
Keokuk, Iowa

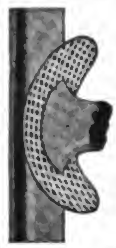
The Quality and Merit Line of Buggy Tops, and Carriage Trimmings and Rubber Tires will increase your sales and make you more friends.

Write for dealers' prices.

Fischer & Metzger, 111-115 W. Court St., Cincinnati, O.

Delmas Welding Plates

Every up-to-date blacksmith should investigate what can be done with Delmas Welding Plates. They save much time and labor and produce better work than welding in the old fashioned way. Delmas Welding Plates weld iron and steel without getting them to a white heat.

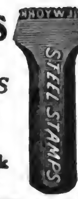


Write us for prices and circulars showing some of the difficult welds anyone can easily make using Delmas Plates.

CHICAGO METAL REDUCTION CO.
Chicago, Ill.

STEEL STAMPS

Steel Letters and Figures
BURNING BRANDS
Stencil Dies, Stencils, Etc.
GEO. M. NESS, JR.
61 Fulton St., New York
Price List sent upon application



FODEN'S MECHANICAL TABLES

SAVE ALL FIGURING!

Tell at a glance how much stock to use for oval or elliptical hoops of any size, the circumferences of circles, weight of flat, square and round stock, and the weight and strength of ropes and chains

Should be in every progressive Smith's hands

Bound very neatly in green cloth. Price, 50c.

AMERICAN BLACKSMITH COMPANY, Buffalo, N.Y.

Foot, Power and Electrical-Driven

Lathes, Hand and Power Planers, Chucks, Tools, Dogs. Catalogue Free. :: :: :: :: ::

SHEPARD LATHE CO.

132 W. 2d St. Cincinnati, Ohio

BRAZING SLEEVES

For putting on Rubber Tires—No Filing or Scarfing.

Lined — Unlined

H. F. WHITE MFG. CO.
305 E. Second St. Cincinnati, Ohio

Never Accept Imitations

When a dealer or jobber tries to impose substitutes for the *good advertised articles*, write us or the manufacturer. We will see that you get the genuine—what you want.

Butcher Knives Made for Blacksmiths

Stamped with YOUR own name

Blacksmith Forged Warranted

We sell to only one smith in each town. By mail only.

Two given for each Unsatisfactory Knife

You can make good money furnishing your customers and friends with genuine **BLACKSMITH FORGED BUTCHER KNIVES** of all kinds. Made from the best crucible steel, tempered by a special oil-drawn process. Every one warranted (we replace each knife not satisfactory with two new ones) to be the very best knives to hold an edge that it is possible to make. All knives ground, polished and finished with riveted handles.

$5.00 TRIAL ASSORTMENT No. 1

Consisting of 38 Assorted Knives that you can easily sell for $12.00 to $15.00. Contains 6 6-inch Butcher; 6 7-inch; 2 8-inch; 6 4-inch Butcher or Poultry; 12 assorted Kitchen; 2 Shoe; 4 7½-inch House or Butcher.

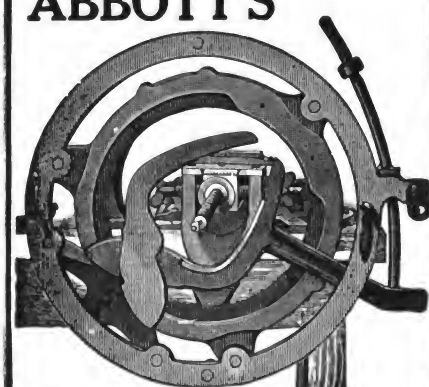
FREE— ONE KNIFE BLADE JUST AS FORGED. ONE IN THE ROUGH PARTLY FINISHED.

YOUR money refunded without a word if you are not perfectly satisfied. **Write today** for Price List Special Offer, order blanks and trial assortment No. 1, enclosing money order for $5.00 and secure the exclusive sale in your vicinity, and the knives will be stamped with **your name** and the word "warranted" and sent to you by express at once.

We refer you to the banks and business houses of Nunda as to our reliability.

OWEN FORGING COMPANY - NUNDA, N. Y.

ABBOTT'S



Little Giant Hub Borers

AND Abbott's Box Puller

Made by ABBOTT & CO., Hudson, Mich., and sold by all Dealers in Carriage Makers' Machinery.

PHINEAS JONES & CO., Newark, N.J.
General Agents for the Eastern States

The New Little Giant Power Hammer

Stands for what is best in design, material and construction. It does THE WORK efficiently and quickly and is always under perfect control.

This high degree of perfection in Power Hammers is the result of fifteen years' experience.

Made in three sizes:

25 lb. 50 lb. 100 lb.

Suitable for forging material up tc 5 in. in diameter.

Will do anything and everything that can be done on Power Hammer.

Recommended by over 4,000 satisfied users.

Manufactured by

MAYER BROTHERS COMPANY

MANKATO, MINN.

AGENTS: United States—All Jobbers
New Zealand—Alex Storrie, Ltd., Invercargill
Manitoba, Saskatchewan and Alberta—Melotte Cream Separator Co., Winnipeg

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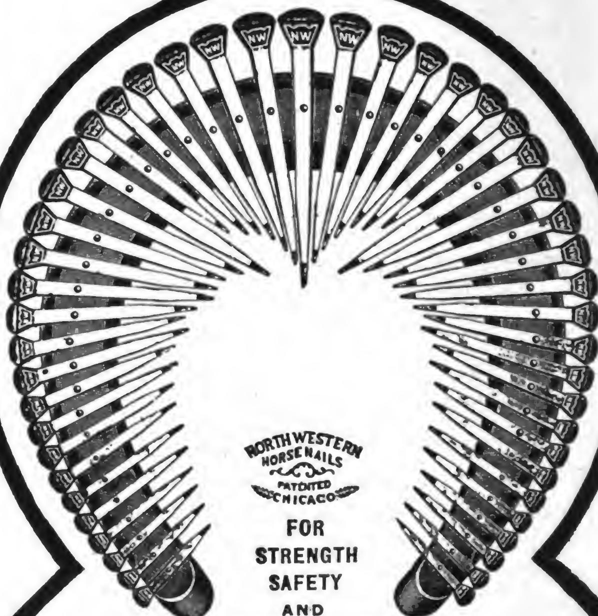


FOR STRENGTH SAFETY AND QUALITY OF MATERIAL.

Northwestern Horse Nails

ARE THE BEST ALL AROUND

The most perfect in form and finish. Made of the best Swedish Iron. Will hold a shoe longer than any other nail made. Note the re-enforced point—makes it easiest to drive and the safest to use.

UNION HORSE NAIL CO., CHICAGO, ILL.

Is Your Anvil Worn Out?

But it is NOT beyond repair, for we can REPAIR old wrought anvils, no matter how badly they are broken.

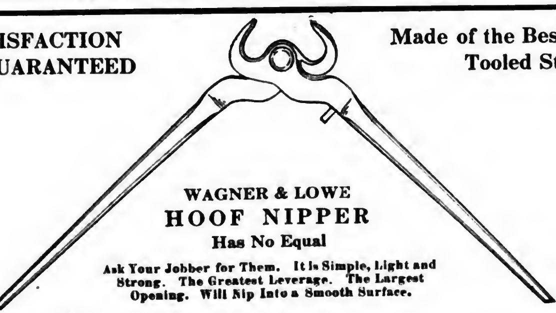
Before buying a new anvil write for our prices—it will pay you.

The Columbus Anvil & Forging Co.

Office, Wyandotte Building
Factory, West Frankfort St.
COLUMBUS, OHIO

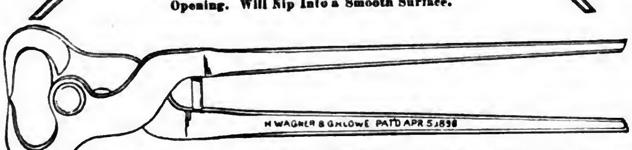
SATISFACTION GUARANTEED

Made of the Best Tooled Steel



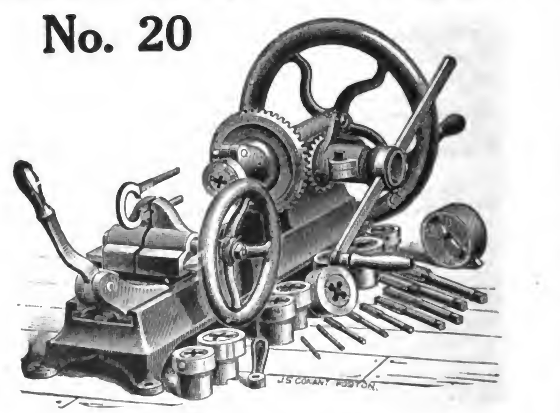
WAGNER & LOWE
HOOF NIPPER
Has No Equal

Ask Your Jobber for Them. It is Simple, Light and Strong. The Greatest Leverage. The Largest Opening. Will Nip Into a Smooth Surface.



THE LOWE MANUFACTURING CO., Enderlin, N. Dak.

Green River Hand Bolt-Cutter and Nut-Tapper No. 20



Threads, bolts and nuts 1-4 to 1 inch. Powerfully geared. Gears are keyed. All parts well fitted. Vise has inserted tool steel jaws, which are reversible.

Send for Catalog 34D and Prices

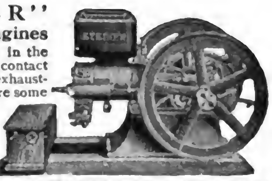
SOLE MAKERS

WILEY & RUSSELL MFG. CO.

Greenfield, Mass., U. S. A.

"STEINER"
Hoppercooled Engines
are by far the cheapest in the long run, our governor, contact maker, watercooled exhaust-valve, water-lip jacket are some of the numerous advantages.

Send for catalog A and state what size you are interested in or what purpose you intend to use it for.



M. STEINER & CO., DAYTON, OHIO.

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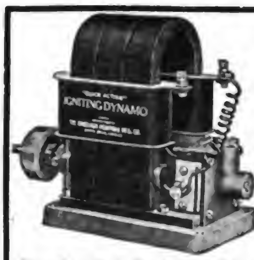
MENTION THE AMERICAN BLACKSMITH



"Quick Action"
Igniting Dynamos
Excel all others.

The only generator that cannot lose its magnetism. For either make and break or jump spark work. Also spark coils. Send for Catalogue B.

The Knoblock-Heideman Mfg. Co., South Bend, Ind.

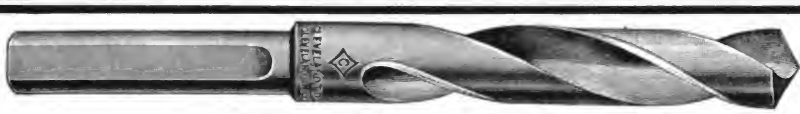
Dissatisfied with Iron you are now using?

TRY "MILTON" BARS

FOR BOTH QUALITY AND SIZE.

Many Blacksmiths using them with very best results.
Write for Prices.

THE MILTON MANFG. CO.,
MILTON, PENNSYLVANIA.



"CLEVELAND"

37 Years of Perfection in Tools

The CLEVELAND Twist Drill Co.

New York CLEVELAND Chicago

"CHICAGO"
EMERY WHEELS CUT QUICK

A wheel that will do the work in one-fourth to one-half less time is by far the cheapest in the long run. A wheel that will save only one hour per day during your busy season would pay for itself in full.

"CHICAGO"
WHEELS SAVE TIME
They're made of stuff that cuts

Emery Wheels, Glue, Emery, Polishing Wheels, Grinding Machinery

136 Page Catalogue for the Asking

Chicago Wheel & Mfg. Co.
108 SO. ABERDEEN ST.
CHICAGO, U. S. A.

Rim Rotting Impossible!
With GOODYEAR WING Rubber TIRES

Patent Wings flaring outward from the base to the top of the rim, prevent sand and water from getting between base of tire and channel. Wings pressing tightly against rim prevent "creeping" and "loosening."

GOODYEAR
Wing Tires

are made only of *fresh, new rubber* and are *backed by our broad guarantee* as to materials and workmanship. Cost no more than ordinary kinds. Insure long service. Easy to apply on old or new channel. Write for our Red Catalog and prices. Every shop should have a Goodyear Improved Rubber Tire Applying Machine. Saves time and labor. Red Catalog gives full details. Write for it.

The Goodyear Tire & Rubber Co., Carr St., Akron, O.
Branches and Agencies in 103 Principal Cities.

Shop Sign
The Ideal Sign for Shoeing Shops

A horse sign represents your business—the sign everybody will see. The horse is pressed from 24-gauge sheet steel and will last a lifetime.

We are not in the "Trust," and sell direct to the Consumer, cutting out the Middleman's profit. Mail orders promptly filled. Send for prices and descriptions.

G. W. GROVE
226 White St. Clyde, Ohio

SUCCESS in the heat-treatment of tool steel for various purposes is one of the biggest factors in your success as a practical mechanic, but you can't get results with a cheap steel. It hasn't got the initial quality to enable it to stand up; and you've got to draw the temper down until you take practically all of the artificial hardness out of it.

SCOTT'S CRUCIBLE TOOL STEELS are made to give results equal to or better than the next higher priced brands of similar steels on the market. The results are absolutely certain when we know the purpose for which the steel is to be used.

Our booklet, "Tool Steel and Its Uses," gives a practical, common-sense explanation of this proposition that anybody can understand.

The book not only lists and describes every one of the many different brands of Scott's Tool Steel, but it also contains valuable information about the treatment of tool steel, which is the result of more than forty years of practical acquaintance with the manufacture of steel and also with the problems of its use and the treatment of it in the forge and machine-shop.

We absolutely guarantee our steel to be perfect in every respect, and will replace without expense to the user any which shows mechanical defects.

THE
BOURNE-FULLER CO
Iron, Steel
Pig-Iron
Coke
CLEVELAND
Pittsburg Cincinnati St. Louis

"The Perplexity of John Smith"

Our Calendar for 1912

THE original painting from which this calendar has been reproduced is a very beautiful water color and was painted expressly for us by the same artist who made the paintings for our two previous calendars. This calendar for 1912 is the third in a series of child studies. The calendar is 8 x 9½ inches in size, reproduced in ten colors, on heavy cardboard, with a calendar pad of convenient size and harmonious tint.

The picture shows a healthy, red cheeked little chap holding a toy horse. He brings his horse to the smith with the evident intention of having the animal shod. The expression of perplexity on the face of the sturdy smith, the smile of the helper and the look of sincerity and innocence on the face of the little fellow are all reproduced as in life, in full color.

Free To "Our Folks"

To every reader of The American Blacksmith whose subscription is paid up to or beyond January, 1912, we will send one of these calendars FREE. If your subscription expires before January, get in line for one of these beautiful calendars. Ask the Subscription Department if you don't know when your subscription expires.

Smith Shop Advertising

For advertising the smith shop there is nothing better than a good calendar, and where will you find a calendar with a more appropriate picture than The American Blacksmith calendar for 1912? The subject is certainly an excellent one, and being reproduced in ten colors makes it an exceptionally beautiful date keeper. Then, too, the price at which we sell them should also be considered. Get prices on a small lot of calendars from printers or engravers, then compare them with the prices we quote.

These calendars will bear no advertising except your own business card of ten words or less. This we will print on your calendars without extra cost. We offer calendars to subscribers of The American Blacksmith only—under no circumstances will orders from non-subscribers be filled—you must be or become a regular reader before you can get any of these calendars.

(1)	**50 Calendars, postpaid (for subscribers only),**	**$2.00**
(2)	**50 Calendars and one year's subscription,**	**2.50**
(3)	**50 Calendars and two years' subscription,**	**3.25**
(4)	**50 Calendars and four years' subscription,**	**4.00**

Larger lots of calendars at the rate of $1.75 for each additional 50. If you can use 500 or more, ask for a special price. If you desire envelopes for mailing calendars we can supply stout envelopes of the proper size at the rate of 25 cents for 50, if envelopes are ordered sent with calendars—30 cents if ordered separately.

All the above prices include all postage or express and packing charges. There are no extras.

If you want calendars order them now. The supply is limited and you may be disappointed if you wait.

The American Blacksmith

P. O. Box 974 Buffalo, N. Y. U. S. A.

Edwards Shears

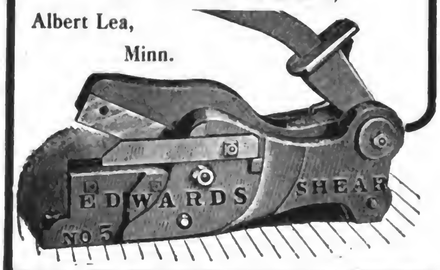
For twenty years the Two Leading Low Priced Shears in the U. S., representing the Greatest Value for the Least Money.

No. 5, weighs 200 lbs., cuts 4 x ½ inch soft steel
No. 10, weighs 430 lbs., cuts 4 x ¾ inch soft steel

At their price you should have had one long ago. Order One from the first iron man that calls on you. They All Sell Them.

Write for descriptive circular and prices.

C. D. EDWARDS,
Albert Lea,
Minn.



THE PERFECT POWER HAMMER

Made in 2 sizes, with 40 and 80 lb. rams, respectively.

The best Trip Hammer in the U. S by reason of its simple construction, efficiency and durability. Only 1 H. P. to run it. **For plow work it is unsurpassed.** Hundreds of them are in use in the best shops and manufacturing plants all over the country. Everyone without exception says there is nothing made that equals the PERFECT HAMMER. The price is within the reach of all. Will ship to any responsible party on approval. Shipping weight of the smaller size about 1100 lbs.

You make a mistake if you buy a hammer without investigating the merits of the Perfect. A descriptive circular for the asking.

For prices and terms write any Jobber, or

MACGOWAN & FINIGAN FOUNDRY & MACHINE CO.
204 North Third Street
ST. LOUIS, MO.

Please mention THE AMERICAN BLACKSMITH when writing to any advertisers in these pages.

"Tools That Wear" HELLER'S CELEBRATED AMERICAN HORSE RASPS,

BORAX-ETTE FOR STEEL TRADE MARK REGISTERED AUG. 22 1905 A PERFECT WELDING FLUX

PREPARED ESPECIALLY FOR WELDING
FAR SUPERIOR TO COMMON BORAX

Try Borax-ette for Welding Toe-Calks

THEY WON'T KNOCK OFF

It makes steel weld like iron. It has no equal for welding tires, axles and springs

FOR SALE BY ALL DEALERS

SAMPLES FREE

CORTLAND WELDING COMPOUND CO., Cortland, N. Y.

THERE IS PROFIT IN TRUE FIT SHARES

TRUE FIT TRADE MARK

Don't waste time making shares by hand.

We can make them for less money than you can.

Use our Fitted Shares for all makes of plows.

Guaranteed to fit and to be first class in every respect.

Write for Catalog

CRESCENT FORGE & SHOVEL COMPANY

MANUFACTURERS OF HIGH GRADE PLOWSHARES AND BLACKSMITHS' BLANKS

HAVANA, ILL., U. S. A.

AIR CUSHION RUBBER HORSESHOE PADS

SEE THAT CUSHION? It fills with air at each step. That's what breaks concussion. That's what prevents slipping. That's what keeps the foot healthy. That's what cures lameness.

Twelve Different Styles

Heavy Leather Back

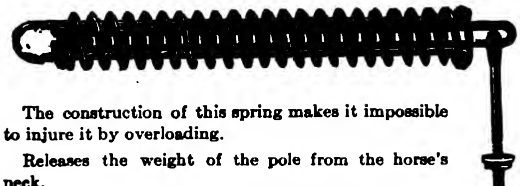
NO LAMENESS
NO SLIPPING

Write us for further information

Exposed Leather Back

REVERE RUBBER COMPANY
Sole Manufacturers **BOSTON, MASS.**

Raymond Pole Spring

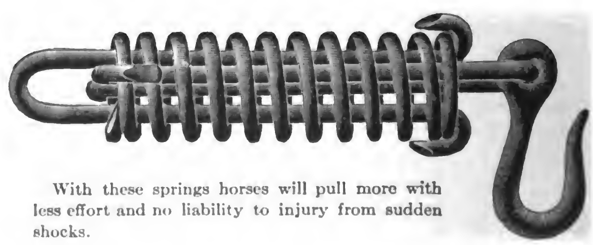


The construction of this spring makes it impossible to injure it by overloading.

Releases the weight of the pole from the horse's neck.

Comfort for the Horse
Economy for the Owner

Raymond Trace Spring



With these springs horses will pull more with less effort and no liability to injury from sudden shocks.

Write your Jobber for Circular and Prices

RAYMOND MANUFACTURING COMPANY, Ltd. : CORRY, PA.

The ***Incomparable*** **400 Blower, the one great** ***Heirloom*** **that will be handed down** ***from one generation to the other. Ask what the owners say***

MADE WITH BALL BEARINGS ONLY

Nearly Half A Million in Use

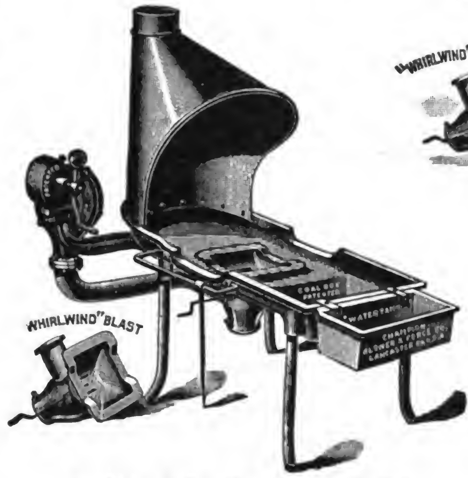
The No. 400 is the Blower that has REVOLUTIONIZED the World in Making Hand Blast

Crank turns either way.

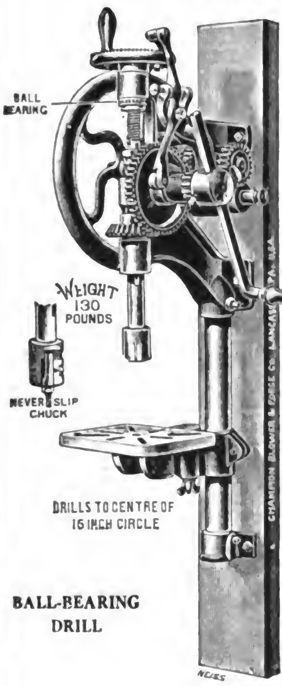
No. 400

The No. 400 Steel Blower will serve the youngest mechanic faithfully without expense for a long lifetime.

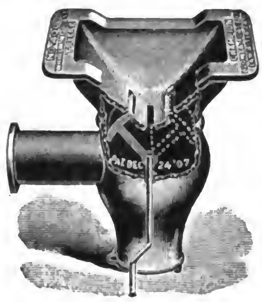
No. 408. Steel Blacksmiths' Forge



No. 433. Cast Iron Blacksmiths' Forge



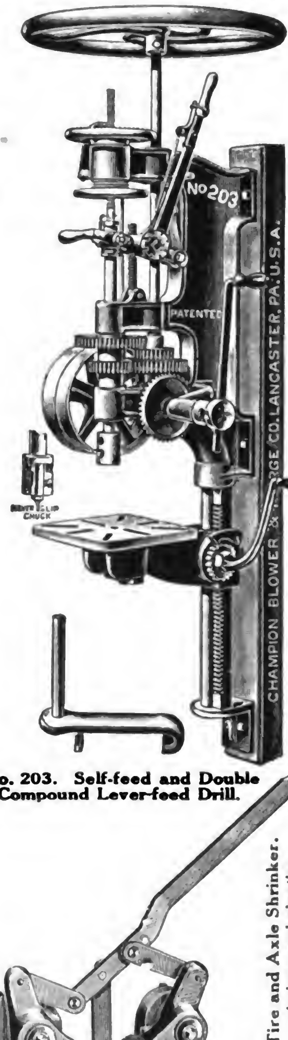
BALL-BEARING DRILL



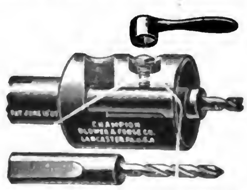
A Tuyere Iron That Makes A Whirlwind Blast.

The No. 400 Champion "Whirlwind" Blast Anti-Clinker, Heavy Nest Tuyere Iron is furnished with all No. 400 Blowers WITHOUT EXTRA COST.

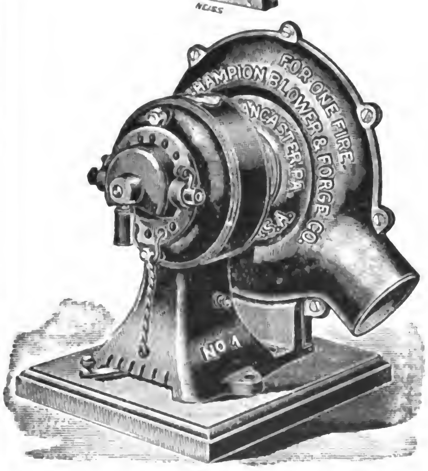
The "Whirlwind" Blast Anti-Clinker Heavy Nest Tuyere Iron produces a circular, rotary whirlwind blast and concentrates the heat in the tuyere nest, not permitting it to blow up and out of the chimney, therefore, makes a hotter fire and heats the iron one third quicker, saving much coal.



No. 203. Self-feed and Double Compound Lever-feed Drill.



The Champion Patented Never-Slip Chuck is applied to all CHAMPION DRILL SPINDLES without extra charge



No. 1—One-Fire Variable Speed Electric Blacksmiths' Blower, with five speeds for LIGHT, MEDIUM and HEAVY fires.

Screw Plates in four styles, cutting up to 1½ in.

Before purchasing a Hand Blower, Forge, Drill Press, Tire Bender, Tire Shrinker, Screw Plate, Power Blower, or Electric Blower, write for our free catalogue, which always shows the greatest variety of improved Blacksmith tools built under one control in the world.

No. 4. American Tire and Axle Shrinker. Will shrink up to 4 x 1 inches round edge tire, and axles up to 1¼ inches.

THE CHAMPION BLOWER & FORGE CO., Lancaster, Pa., U. S. A.